

AI AUTOMOTIVE INDUSTRIES

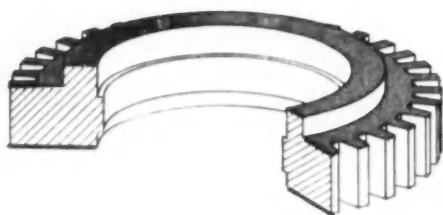
JANUARY 15, 1953

AUTOMOTIVE and AVIATION MANUFACTURING
CIVILIAN AND DEFENSE
ENGINEERING • PRODUCTION • MANAGEMENT

In This Issue . . . Dodge Cylinder Head Tooling . . . '53 Cadillac
Oldsmobile, Nash, Hudson Jet, Super Jet Designs
COMPLETE TABLE OF . . . Heavy Press Developments . . . Automotive
CONTENTS, PAGE 3 Plans for 1953 . . . Fawick Three-Shoe Brake

A CHILTON PUBLICATION

Heald Model 261 Rotary GRINDS 3 FACES



**Two faces and hub end of
steel gears surface ground
on one machine, with
quick-change setup**

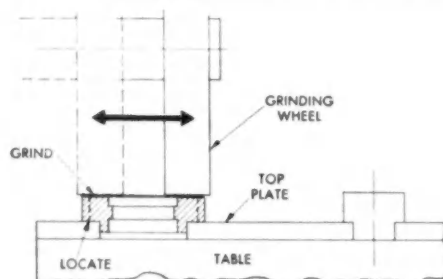
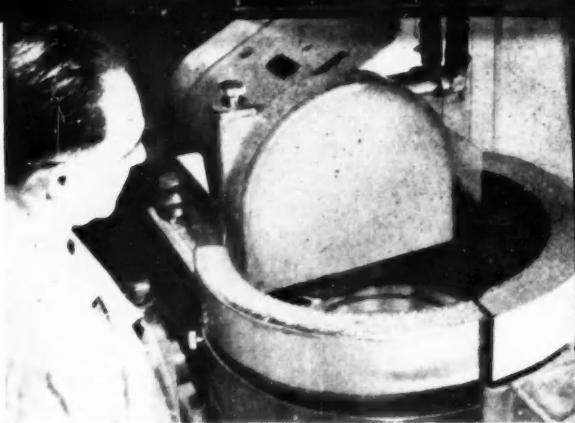
A gear job like this is a natural for the Heald Model 261 Rotary Surface Grinding Machine. The setup illustrated here combines high precision with fast, easy operation and quick changeover for each of the three surfaces ground.

An auxiliary top plate fastened to the rotating chuck is recessed to hold ten gears for the first two operations. A stake fixture in the center holds the parts individually for the final operation. In the first operation, the gears are ground ten at a time on the large face opposite the hub. For the second operation, the parts are turned over and the hub ends ground ten at a time. In the third operation, the parts are transferred to the stake fixture in the center of the chuck, where they are ground singly on the adjacent hub face.

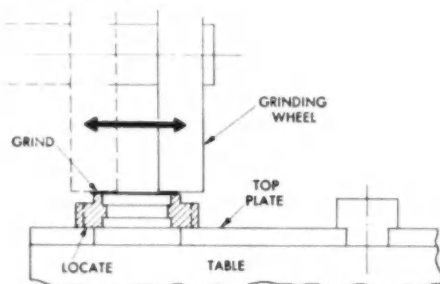
Remember—when it comes to precision finishing, it pays to come to Heald.



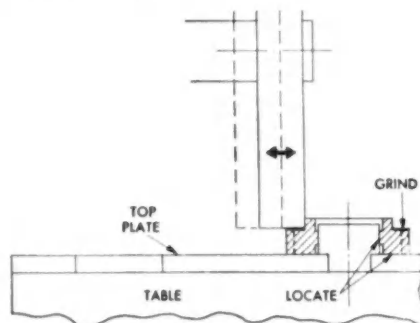
*Heald precision speeds
the nation's production*



First Operation: Parts ground ten at a time on large face.



Second Operation: Parts ground ten at a time on hub end.



Third Operation: Parts ground singly on adjacent hub face.

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

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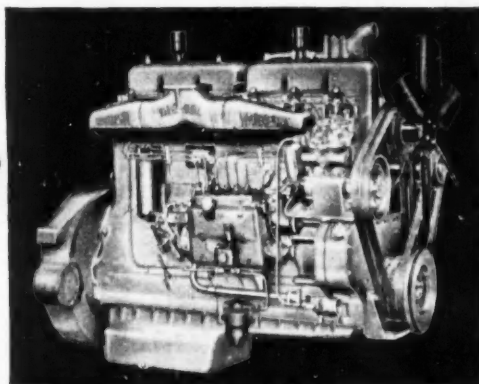
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779 cu. in. displacement,
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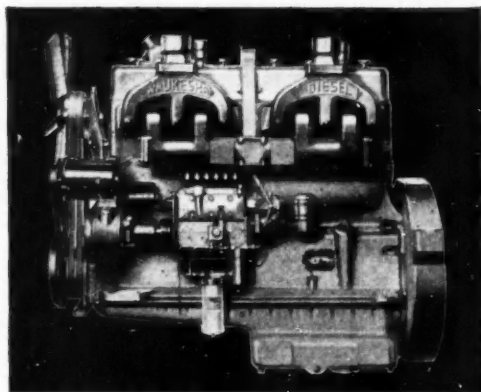


CROSS COUNTRY

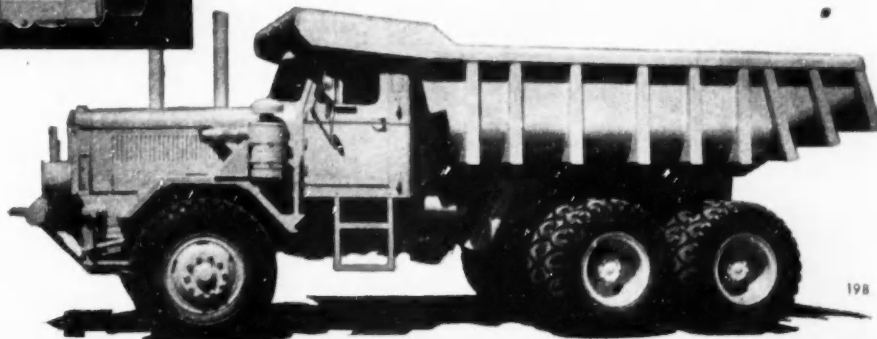
where the pay-off is on payload—you'll make more miles and cut costs too, with this modern feature-packed truckers' Diesel—High-Duty Waukesha 148-DK.

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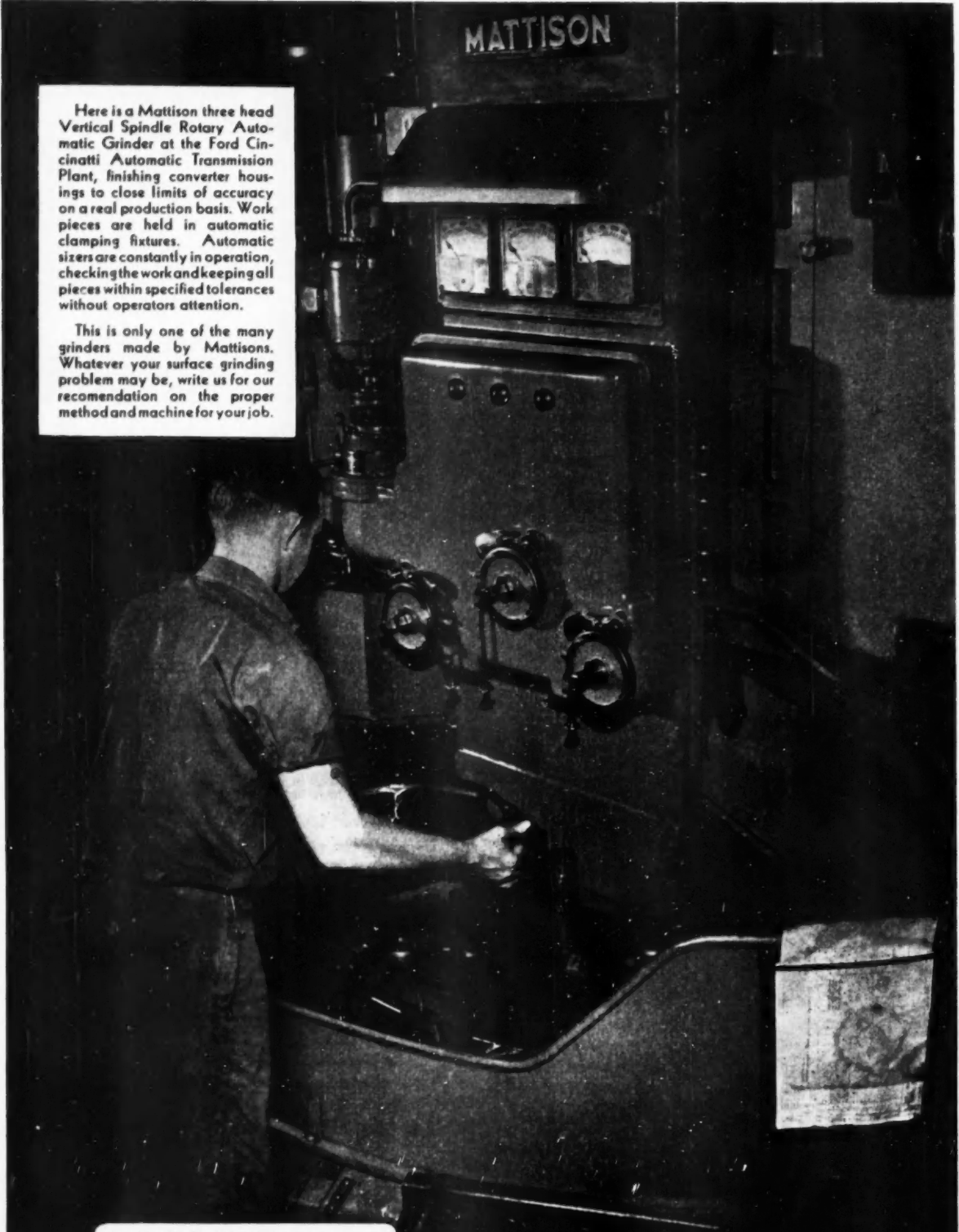
in and out . . . down and up . . . over and through . . . go the trucks with Waukeshas—Super-Duty Six Diesels putting out the power that pulls and pays.



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six cylinders, 6 1/4-in. x 6 1/2-in.,
1197 cu. in. displacement,
peak horsepower 225.
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MATTISON

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A CHILTON MAGAZINE

PUBLISHED SEMI-MONTHLY

AI

AUTOMOTIVE INDUSTRIES

JANUARY 15, 1953

VOL. 108, NO. 2

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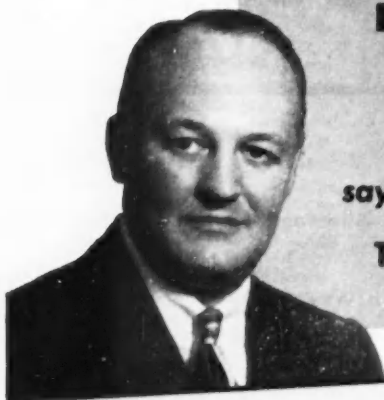
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AUTOMOTIVE INDUSTRIES, January 15, 1953

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THE WILLETT COMPANY
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October 10, 1952

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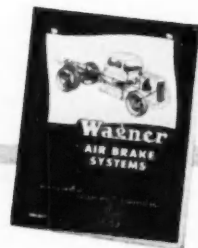
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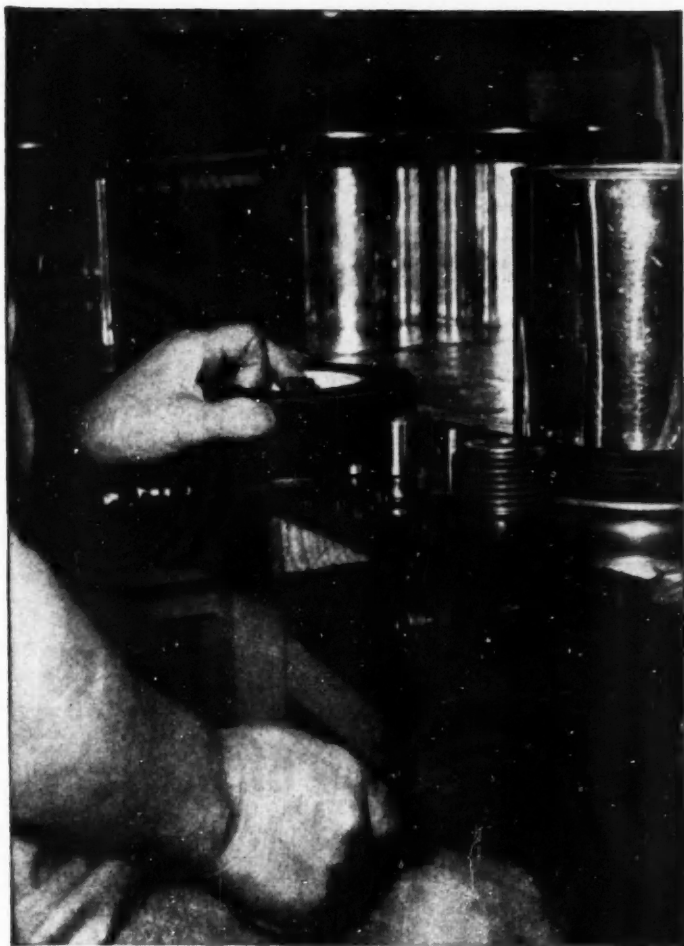
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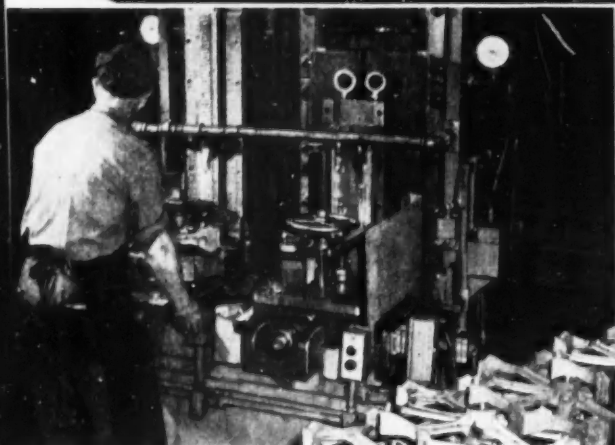
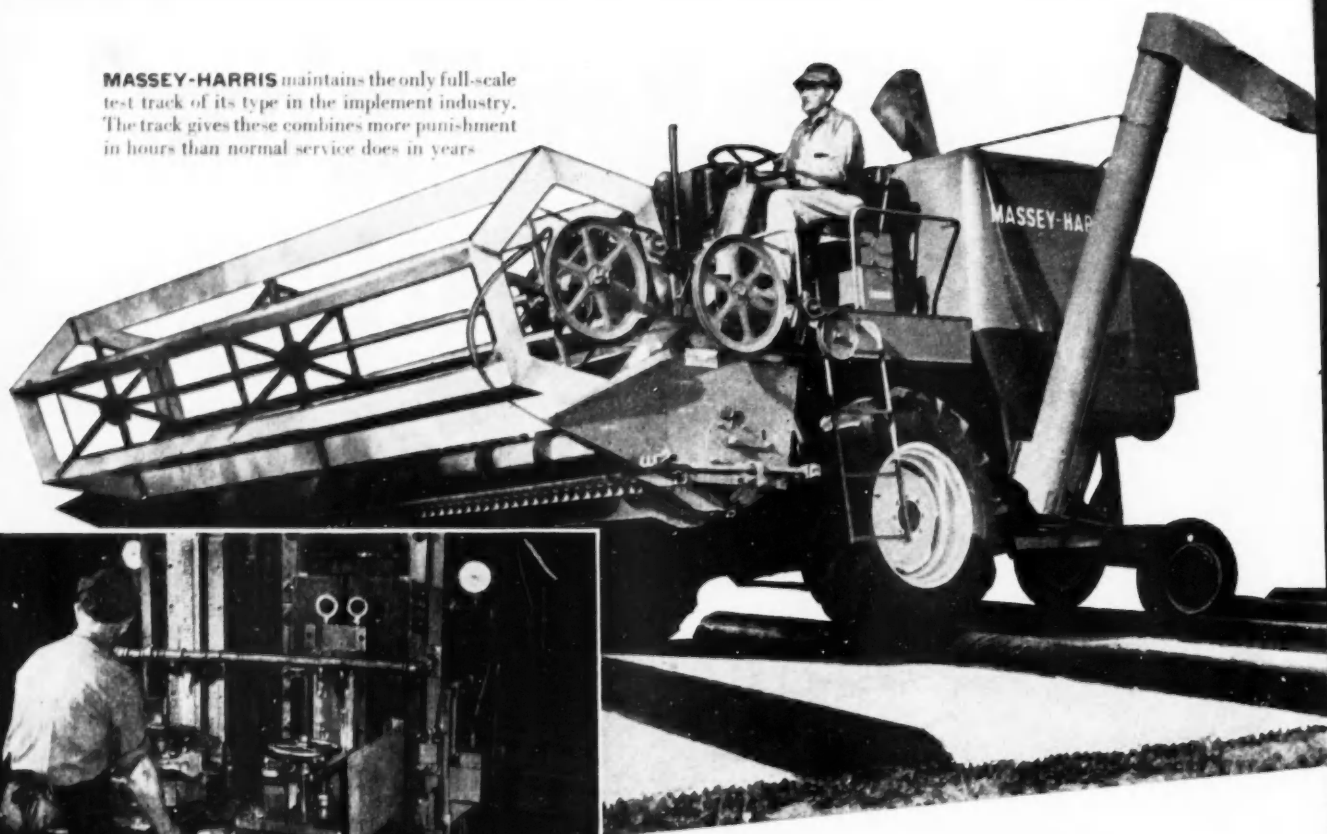
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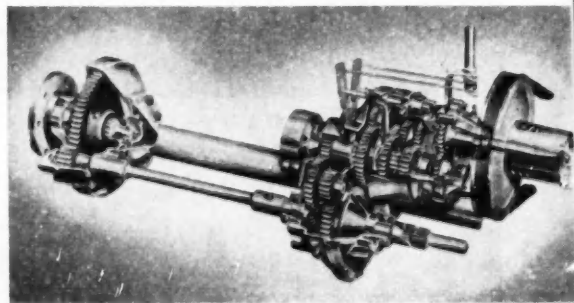
SUNOCO EMULSIFYING CUTTING OILS are used in machining many precision parts. Being broached here are cylinder ends which hold the thresher bars. It is their function to maintain the thresher bars in close alignment with the concave bars to provide efficient operation.

MANY PARTS OF NEW MASSEY-HARRIS COMBINES MACHINED WITH SUN CUTTING OILS

The new Massey-Harris Self-Propelled Combines are precision mechanisms. They are as perfect as a century of experience, modern engineering and production can make them. Sunoco Emulsifying Cutting Oils are used in machining close tolerance parts; Sunicut Cutting Oils are used where an emulsifying oil is not suitable.

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...and we're grateful

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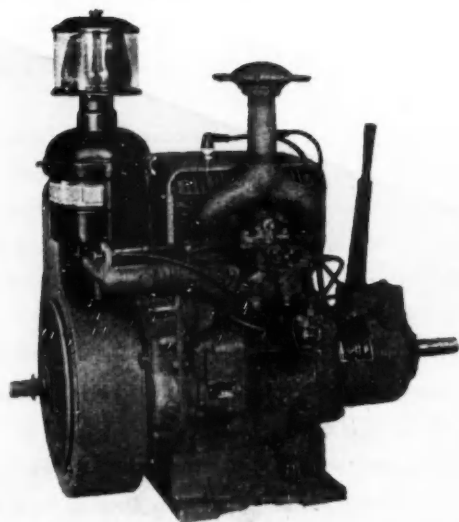
We invite your inquiry.

Wisconsin Engines Protected by UNITED

Wisconsin Motor Corporation, world's largest builder of heavy-duty air-cooled engines, is one of many well-known manufacturers who use United air cleaners as original equipment. Illustrated is the Model TF, Wisconsin air-cooled engine equipped with United Oil Bath Air Cleaner and United Pre-Cleaner.

UNITED SPECIALTIES COMPANY

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And when the job is *really tough*, Ross supplies hydraulic power steering in our special Hydrapower gear. We invite discussion of *any steering problem.*

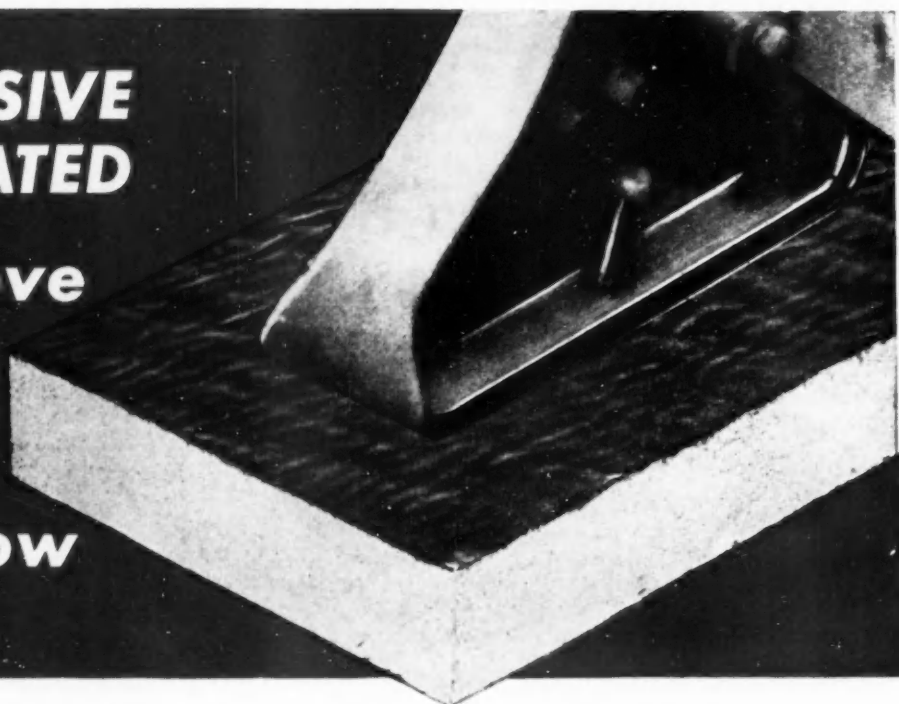
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AUTOMOTIVE INDUSTRIES, January 15, 1953

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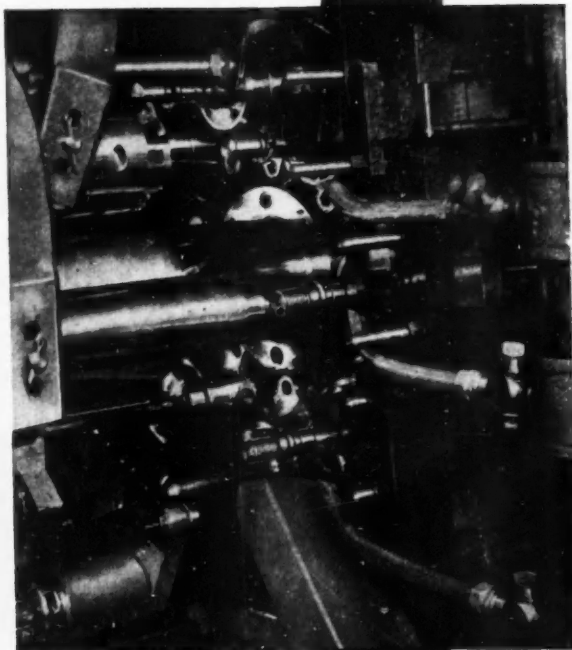
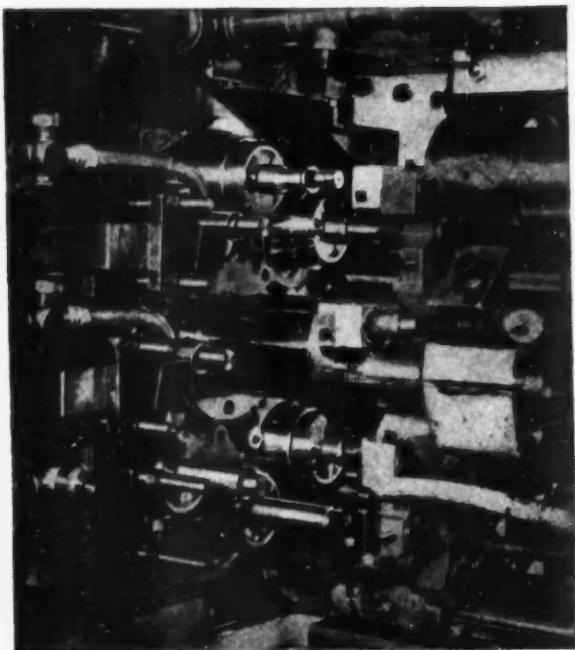
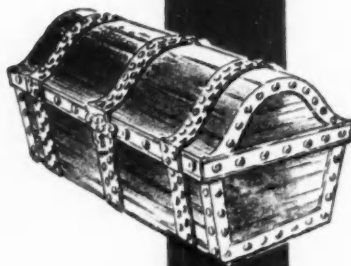
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PIECES FROM EIGHTS

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CONOMATIC Eights have had the usual opportunities available to any production tools that can handle added requirements and responsibilities.

With more tool positions than other "automatics", Eight Spindle CONOMATICS have an advantage in taking on, at one chucking, operations that save the costs of second handling.



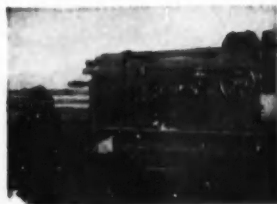
Rear Side of Tooling Area

Front Side of Tooling Area



The milling and stamping operations performed by the 1 $\frac{1}{2}$ -EIGHT, on the piece shown, did not require stopping the spindle. The dependable performance of CONOMATICS makes such money-saving operations well worthwhile.

A Comparison of ALL Automatics is in favor of Cone



Conomatic}

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*It's welded...
but you can't feel
the weld*

• A special tool removes any exterior weld flash from electric-welded steel tubing immediately after welding . . . thus the *eye-appeal* of products like tubular steel furniture. If required, the inside can be similarly finished, meeting the *functional* requirements of products like pneumatic tube systems.

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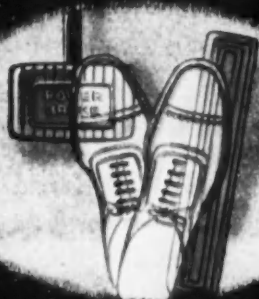
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Bendix leads again...

with
the only
performance proven
LOW PEDAL
power brake



NOW *Stopping*
IS AS EASY AS *starting*



It is no longer necessary to lift the foot and exert leg power pressure to bring your car to a stop. With the Bendix Low Pedal Power Brake on about the same level as the accelerator, an easy ankle movement, much like working the accelerator is all the physical effort required for braking. And by merely pivoting the foot on the heel, shifts from "go" to "stop" controls are made in far less time.

Result: More driving comfort, less fatigue and greater safety.

The Greatest Improvement in Braking Since Four Wheel Brakes

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The Bendix® low pedal power brake represents an entirely new conception of power braking designed specifically to meet the braking requirements of the industry's latest and finest vehicles.

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Passenger car manufacturers contemplating power braking should investigate the advantages of the Bendix low pedal power brake. *REG. U.S. PAT. OFF.

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High Spots of This Issue

★ Automotive Plans for 1953

The new year ahead bears every portent of being a good one for the automotive industries. High production, fewer Government controls, and more competitive selling are seen in the cards shuffled to compile this report from Detroit. See Page 32.

★ Dodge Tools Up Three Lines for Cylinder Head Production

Following close on the heels of a previous article devoted to machining operations on the cylinder block of Dodge's 140-hp engine, this discussion treats the output of cylinder heads. Each stage in production is carefully outlined here. Page 34.

★ Heavy Press Program Moves Forward

Focal point of interest at the recent ASME meeting in New York was the progress being made in the Air Force heavy press program. Analyzed in this review are developments to date and portions of technical papers. Page 40.

★ Washington Outlook for the Years Ahead

Rumors are flying as to what will happen when defense spending takes its inevitable downturn. According to this report, a slack will be felt by 1955, so business must concentrate on private markets. Automotive prospects are surveyed. Page 46.

★ Quick Testing for Tool Life with Radioactive Cutting Tools

The time required for laboratory work has always been the most troublesome fly in the ointment of efficient and rapid tool testing. The radioactive method, described in this article, appears to offer a practical solution to the problem. Page 48.

★ 40 New Product Items

And Other High Spots, Such As:

The horsepower race—1953 version; Cadillac horsepower at all-time high; Oldsmobile ups horsepower and adds 12-volt system; Hudson Jet and Super Jet; industry previews and reviews; 1953 Nash improvements; new three-shoe brake; and GMC light trucks for 1953.

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AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
• BOATS • TRAINS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT



Steel-Service Team In there -- Pushing

Now more than ever the help of an experienced steel-service organization is especially valuable. That's why it may well pay to get in touch with the nearest Ryerson office or plant.

Not that we can *always* furnish the steel you need—much as we would like to, and hard as we try. But, with controls relaxing a little and a few steel products coming into better supply, there are more opportunities for experience and ingenuity to take over. And experience, ingenuity—and the will to help are never in short supply at Ryerson.

Your nearby Ryerson plant is staffed with specialists on carbon, alloy and stainless steels who are always ready to work with you. Often they

can suggest practical alternates when the steel you need is not available. And back of the Ryerson plant nearest you stand the resources of fourteen other Ryerson plants, making up the nation's largest steel-service organization. So when a kind or size is not on hand locally, we may be able to ship it from another plant.

With all Ryerson plants cooperating, and with Ryerson specialists helping to make the most of available steel, we are usually able to maintain service in spite of the current situation. So we suggest that you check with us regularly for all your steel requirements . . . There is nothing too difficult when it comes to working with a Ryerson customer.

Principal Products: Carbon, Alloy & Stainless Steels — Bars, Structurals, Plates, Sheets, Tubing, Machinery & Tools, Etc.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 108, No. 2

January 15, 1953



SEA-DART

The Convair XF2Y-1 Sea-Dart is the first American delta-wing seaplane to be shown publicly. The Navy fighter was undergoing preflight trial runs in San Diego Bay last month. It is powered by two Westinghouse turbojet engines, and is equipped with hydro-skis.

All Makers Participate in Chicago Auto Show

All exhibit space at the Chicago automobile show scheduled for Mar. 14-22 at the International Amphitheater was sold early in December, according to show officials. All automobile manufacturers will be represented at the show, along with nine makes of trucks. In addition, several specially built deluxe car models will be on display, together with many engineering and styling exhibits. A special feature of the show will be a one-hour stage review called "Stars of Motordom" to present the 1953 model cars on stage. The show this year is being held a month later than a year ago because the date was set last summer when the steel strike was on and car makers thought new model introductions might be delayed until March. About 500,000 visitors are expected at this year's show, which would exceed the record 474,000 set last year.

Officials of the Chicago Automobile Trade Association have again

repeated their views that the Chicago automobile show should be made the national show. Officially, automobile manufacturers have not commented on the proposal, but it is definitely understood that they are cool to the idea. The Chicago exhibition always has been a selling show, while the manufacturers have in mind an institutional display to introduce new models and build good will for the industry.

Cadillac Cuts Price of Power Steering

Since power steering was first introduced it has been forecast that price of the unit would come down when volume production is achieved. Cadillac has made the first step in that direction by reducing the price of the power steering option by \$21.45, bringing the price to \$176.98. More than 80 per cent of Cadillac buyers specify power steering option. Now that Chevrolet and Pontiac will offer power steering this year, volume production should result.

AAA Head Sees Higher Car Taxes, Insurance

Higher special taxes on motorists, higher automobile insurance rates, and possibly an increase in number of toll roads this year are predicted by Ralph Thomas, president of the American Automobile Association. He said, however, that the country now is beginning to make a real dent in the huge backlog of needed highway building and that the \$5 billion spent last year for highway and street improvement was at the highest rate in history.

Automotive groups and some Congressmen are planning a determined fight to lower Federal taxes on motorists during the upcoming session of Congress. Figures on taxes paid by motorists during 1952 compiled by Automobile Manufacturers Association show that it is high time for such a move. Special taxes collected on motor vehicles totaled a record \$5 billion last year—an increase of \$300 million over 1951, despite a drop in the total of Federal excise taxes collected from manufacturers on new vehicles because of lower production. However, an offsetting factor militating against an overall tax reduction for motorists despite what action Congress takes, may be the intensive drive for funds to expand and modernize the national highway system.

Dodge Restores Fluid Drive

Dodge Div. of Chrysler Corp. is going back to fluid drive option on cars equipped with manual transmissions and manual transmissions and overdrive because of demand from customers. The cars will be thus equipped, however, only on orders from dealers. The option applies to six-cyl models with the exception of the suburban station wagon. The move brings to six the number of transmission options offered by Dodge.

News of the AUTOMOTIVE



CRASH TRUCK

This huge tow truck will handle a dead weight of 60 tons. Built by White on a WC-2864 TDW model 185½-in. wheelbase chassis, it weighs 18 tons. A 200-hp Cummins Diesel engine powers winches, steering. Booms can lift overturned trailer, drop it on truck's fifth wheel.

Buick Prices Show Downward Trend

Buick Motor Div. announced price cuts ranging from \$11.37 to \$135 on ten models in its 1953 line, compared to corresponding 1952 models with similar equipment. A price increase of \$125 was announced on four models in the Super series, accounted for by the increase from 128 to 170 hp with the introduction of the new V-8 engine.

A reduction of \$135 was made on all four models in the Roadmaster series, apparently a compromise with the introduction of the new V-8 engine and the inclusion of last year's \$185 power steering option as standard this year.

All Special models now include turn signals as standard equipment, which accounts for the \$11.37 price reduction over last year's models with the same equipment. The Special convertible was reduced an additional \$75.

List price of the Skylark sports car will be \$4596, and it will be delivered fully equipped for \$5000 fob Flint, Mich. Air conditioning, offered as optional equipment on the Super and Roadmaster Riviera and four-door sedans, will sell for \$594 plus state and local taxes.

New Powdered Metal Tested for Jets

A new powdered metal said to have light weight, great strength, and high

heat resisting characteristics has been announced by Kenna-Metal, Inc. Called Kentanium, the new metal consists of approximately 60 per cent titanium carbide, 30 per cent nickel, and the balance columbian and other materials. The company reports that it is being tested by jet engine manufacturers to determine its performance under high temperature conditions prevailing in jet engines.

One characteristic of the metal is that it must be formed into a close approximation of its final shape at the time the metal is produced, since it is not easily forged or shaped later. Current cost of Kentanium is about \$15 a lb, which the company says could be reduced if it should come into wide commercial application.

Ford Sets Dates for Anniversary Fete

The 50th anniversary of the Ford Motor Co. will be celebrated around the country this summer. Beginning with the reopening of the Ford Rotunda as a showplace and with the dedication of a new Ford Archives Building in May, the event will be highlighted by radio and television programs on June 15. The new Engineering and Research Center will be dedicated on June 16, the date of the company's founding in 1903. Dinners will be held in 33 cities where Ford plants are located, and Ford dealers will hold open house throughout the month of June. The first volume of an official company history will appear later in the year.

Two Auto Men Named to Defense Posts

Two more automotive men have been added to the top level team of the new administration in Washington. Roger M. Kyes, general manager of General Motors Corp. Truck and Coach Div. and a GM vice-president, has been named deputy secretary of defense to serve under C. E. Wilson, formerly GM president. Kyes joined General Motors in 1948 as a member of the central office procurement staff and was made general manager of GMC Truck and Coach in 1950. The other appointee is H. E. Talbott, member of the Chrysler Corp. board and finance committee and board of Electric Auto-Lite Co., as secretary of the Air Force.

Convair Will Design Supersonic Bomber

Consolidated Vultee Aircraft Corp. has the job of preparing for the Air Force detailed plans for production of a multi-engine supersonic jet bomber, informally called the "Hustler."

While the Air Force request for plans does not constitute a production contract, it appears to give Convair the inside spot in the race to build an intercontinental heavy bomber that will fly faster than sound. Such a plane, even if produced without the necessity of extensive prototype evaluation, would not be expected as a part of the military air fleet until late in this decade.

Design studies relating to supersonic bombers have been turned in by "other aircraft manufacturers," according to Air Force spokesmen. One of these firms is known to be Boeing Airplane Co., builders of the long-range, jet-powered B-52, which has been ordered into production.

Current Air Force plans call for building jet bomber strength around the heavy B-52, the medium B-47, and the light B-57. Air Force under secretary R. L. Gilpatrick said recently 350 B-47's had been delivered, but volume production of the other two planes is just beginning.

No claims of supersonic speed potential have been made for any of the bombers, though as more powerful engines are developed for them their speed rating will be subject to change.

AND AVIATION INDUSTRIES

Ford Develops New Ignition Points

Ford Motor Co. has developed a new type of ignition points which the company says have twice the life of present types. A small hole in the tungsten contact disk of the breaker point ventilates and cools the surface and prevents the transfer of melted metal from one point to another. It also permits foreign matter at the contact to be blown free. The parts are being used in production on Lincoln and Mercury, and soon will go on Ford. They also will be offered as replacements through dealers as soon as quantity production is attained.

Easier Steering Announced for Trucks

The Autocar Co. announces it has developed virtual passenger car steering for its new V-8 truck chassis. The new steering results in safer, more comfortable driving, Autocar states.

The new steering geometry was the by-product of changes necessitated by the V-8 power plant in the Autocar chassis. Changes included:

Lengthening front spring from 44 to 50 inches, giving softer and better spring strength; mounting spring anchor in front of axle; adding a cross member spanning the frame under the bell housing of the transmission, giving added torsional rigidity to the frame rails.

King pin angle was reduced from eight deg to 5½ deg, thus cutting physical effort required to turn the wheels. Length of the Pitman arm and the steering spindle arm and ball were adjusted so that the brake reaction with the softer spring does not produce steering wheel shock.

Jet Contract Raised at Ford

A \$20 million supplement to the Ford Aircraft Engine Div.'s contract for the manufacture of the Pratt & Whitney J-57 turbo-jet engine was announced last month. The total amount allocated by the Air Force to Ford for jet manufacture at the Chicago plant now is \$97 million.

Initial J-57 deliveries are set for February 1954. Production schedules

from the Air Force run through the middle of 1955, and planning schedules extend beyond that date, a spokesman said.

Experimental forging, foundry and machining operations for the J-57 have been going on since October. Machining tryouts began last month. The start of experimental machining operations on the J-57 program will not affect production of Wasp Major engines, it was explained. However, in the J-57 pilot production line, engineers are planning to employ over 400 machines which will be converted from Wasp Major manufacturing.

GM Names Three New Division Managers

General Motors Corp. has announced changes in top management personnel in three of its divisions. Thomas E. Hughes, formerly assistant general manager of Cleveland Diesel Div., has been named general manager to succeed George W. Codrington, who is retiring after 36 years with GM. Edward A. Kaegi, formerly factory manager of Delco Radio Div., has been named general manager of the Detroit Transmission Div. to succeed Victor A. Olsen, who is retiring after 37 years of service. Paul W. Rhame, previously assistant general manager of Allison Div., is the new general manager of New Departure Div. He succeeds Robt. E. Waldo, who has been granted a leave.

Clevite Forms Two Research Groups

A large-scale expansion of Clevite Corp.'s research and development activities was announced last month. The program calls for establishing two new companies in these fields, both serving the entire Clevite group, of which the Cleveland Graphite Bronze Co. is the largest operating unit.

One new company perpetuates the name of the Brush Laboratories Co., with Dr. C. Baldwin Sawyer as president. It will conduct research in the properties and characteristics of metals, crystals, and other materials, in developing new methods and techniques for their production, and in other basic fields.

The second new company is named Clevite-Brush Development Co., with Alfred L. Williams president. This group is seen as the link between basic research and the manufacturing and marketing operations of the various Clevite-owned companies. Beginning with a staff of about 140, it will be largely concerned with developing new products which can be made by the operating companies.

A considerable expansion in the size of both of the new units is projected.

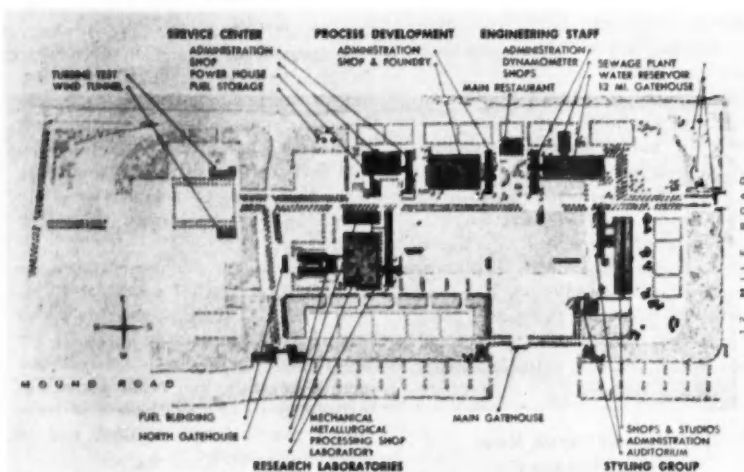
Simultaneously with the formation of these groups, the manufacturing and sales organization of the Brush Development Co. takes the name of Brush Electronics Co., with W. Russell Burwell as president.



THE CARIBBEAN

First of Packard Motor Car Co.'s new line of luxury cars, the convertible Caribbean is now in production. Styling was derived from the Pan American shown during the past year. The 180-hp engine is used. Price less tax is \$5200.

News of the AUTOMOTIVE



GENERAL MOTORS TECHNICAL CENTER

Latest unit to be completed at the technical center northeast of Detroit is the turbine test building, a late addition to the original plan for the center. The engineering staff section, power house, and several utility buildings are also in use, largely on defense projects.

Willys, GM, to Sponsor Coronation Coverage

Like the presidential inauguration in this country, radio and television coverage of the coronation of Queen Elizabeth II in London June 2 will largely be sponsored by automotive companies. General Motors Corp. will underwrite the NBC radio and television coverage for United States listeners and viewers. Tape recordings and a live broadcast direct from Westminster Abbey will comprise the radio coverage. Television details will be announced later. CBS radio and television coverage will be sponsored by Willys-Overland Motors, Inc., which has been active in public service programming recently. Both Willys and GM have assumed radio and TV sponsorship of the presidential inauguration in Washington on Jan. 20.

Northrop Explores Titanium

The possibilities of fabricating Scorpion F-89D rocket firing wing tip pods from titanium are being explored by Northrop Aircraft, Inc., under a special engineering design contract awarded by the Air Force.

Terms of the contract call for the redesign of a F-89D tip pod to determine fabrication techniques and obtain engineering design data necessary for use of titanium. Laboratory research now being performed in the tip pod redesign is furnishing considerable basic metallurgical, physical and structural data on commercial pure titanium and some of the alloys now available. The F-89D tip pod was chosen for this project because its design and construction involve the greatest variety of forming, machining, welding and other airframe fabrication techniques of any composite unit of comparable size.

Chrysler Grant Aids Nuclear Research

Chrysler Corp. will finance a \$250,000 engineering research program at the University of Michigan, in the area of nuclear physics. It will include a study of radio-active tracers to measure wear of various materials and use of radio isotopes to determine atomic structure of materials. The research program will be part of the so-called Phoenix project which carries on research in peacetime applications of atomic energy.

Ordnance Adds to Defense Contracts

Even though the tempo of defense orders has been slowed under the stretch-out program, orders still are coming into the automotive industry. Army Ordnance recently announced that more than \$30 million worth of war work had been awarded in the Detroit area. Oldsmobile Div. of General Motors Corp. received the largest order, totaling more than \$13.4 million for rocket assemblies and an additional award of \$883,223 for development of guns. Small orders went to AC Spark Plug Div.—\$218,890 for tools and equipment, and to Pontiac Motor Div.—\$179,423 for facilities.

Diamond T Motor Car Co. has received a supplemental contract from Army Ordnance in the amount of more than \$9.8 million for trucks and truck parts. The new order is in addition to one granted last May totaling more than \$45.2 million. Studebaker Corp. has received a small additional contract for trucks and parts in the amount of \$803,582. Studebaker's defense contracts now total about \$478 million.

Lord Nuffield Retires

Lord Nuffield, who founded Morris Motors in England more than 40 years ago, has retired at the age of 75. Although he will no longer take an active part in the affairs of British Motor Corp. which was formed about a year ago from a merger between Morris and Austin Motor Co., he will carry the title of honorary president. Leonard Lord, who had been president of Austin Motors, succeeds Lord Nuffield as head of British Motor Corp.

New K-F Oil Filter Cools as it Cleans

Kaiser-Frazer Corp. now offers an oil filter which incorporates cooling fins on the die cast body to draw heat from the oil going through the filter. The unit was developed as an accessory for the company's passenger cars and is manufactured by Aircraft Products Co. of Danville, Ill.

AND AVIATION INDUSTRIES

British Jet Starter Licensed to UAC

A new liquid-fuel turbine starter, developed by Plessey Co. Ltd., Ilford, Essex, is to be manufactured under license, by the Hamilton Standard Div. of United Aircraft Corp. This starter is claimed to be the first liquid fuel type successfully to utilize a mono-propellant, a fuel which burns and produces energy without air. The starter can bring any aircraft gas turbine to idling speed in 10-15 sec and is claimed to possess important advantages over other types. Among these is the reduction in flying weight as compared with a cartridge starter of equivalent power, and the fact that the number of starts is limited solely by the size of the fuel storage tank which may be installed in any convenient position. Low cost per start, ease of maintenance and re-charging, and independence of external sources of power are other points in its favor.

Navy Orders H-S Engine

ACF-Brill Motors Co's Hall-Scott Motor Div. has received a contract from the Navy totaling approximately \$3 million for the manufacture of a quantity of fresh water type marine V-12 Defender engines. This contract brings ACF-Brill's backlog of unfilled orders to \$35 million.

The Hall-Scott Defender engine was originally designed and built for salt water service although it can be adapted for fresh water use also. It develops 630 hp at 2100 rpm.

ACF-Brill Motors Co. has received a contract for a quantity of aircraft crash rescue, forcible entry trucks, amounting to approximately \$3 million, from the Air Force. This vehicle is a 4 x 4, ¾-ton model, utilizing a special body mounted on a standard Ordnance M-56 truck chassis. Body and cab are to be integral, and principally of aluminum sandwich design.

The various components of equipment are to be housed in compartments and will be accessible from outside the vehicle. Equipment includes power-driven circular and push-pull saws, winch, hydraulic ram, two-way radio, and firefighting equipment.

Western Motorama

The new and unusual in custom cars, hot rods, racers, sports, and foreign cars, and technical innovations drew over 120,000 people to the recent Third Annual International Motorama in Los Angeles, Calif.

The use of glass fiber bodies drew special attention from motor enthusiasts. Eleven show cars including the Darrin experimental K-F model displayed complete glass fiber bodies. Several commercial exhibits offered glass bodies and parts. One firm displayed a body unit complete with fittings for an MG or any 95 in. wheel-base chassis, quoting a \$685 price.

Trucking Industry 2nd

The trucking industry now ranks second in the United States in number of employees, according to W. F. Carey, president of American Trucking Associations, Inc. He reports that the industry last year added half a million new employees, bringing the total to over six million. Truckers last year paid out \$21 billion in payrolls, and invested more than \$2.6 billion in new equipment.

Goodyear Aircraft Lists Subcontract

Goodyear Aircraft Corp. plants will produce components for the Air Force's twin-engine T-36A trainer-transport.

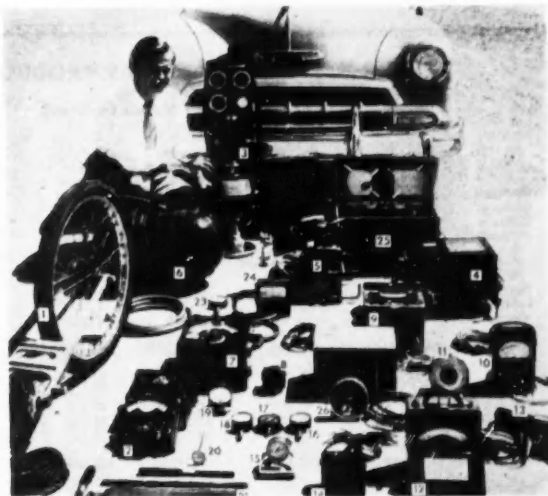
Under terms of subcontracts with the Beech Aircraft Corp., the Goodyear plant at Litchfield Park, Ariz., is to produce the canopy assembly, the cabin section of the fuselage and the tail cone. In its Akron, O., plants, the company will produce trailing edges for the wings and flaps, main gear landing doors, nose gear landing doors and several access doors and panels for the nacelles.

Production at both Litchfield Park and Akron is under way. The contract with Beech Aircraft extends through 1954. Besides Beech and Goodyear Aircraft, production has been assigned to Canadair Limited, Montreal.

Weber Aircraft Corp., Burbank, Calif., received a major sub-contract for ejection seats from Temco Corp. Dallas, Tex. The ejection seats will be manufactured for installation in the Navy F3H jet fighter.

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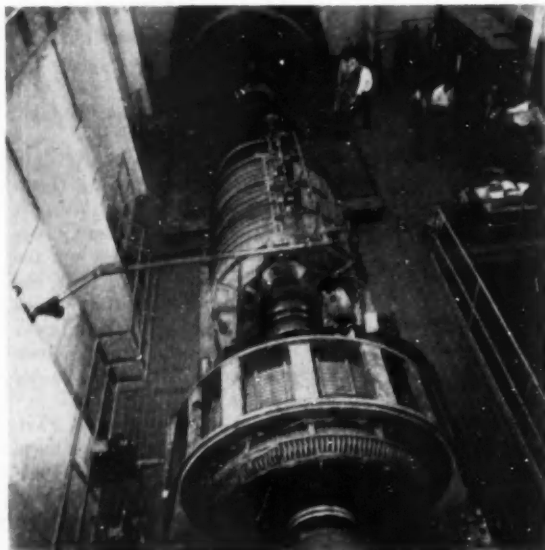
These are the instruments used in Chevrolet road tests: (1) Fifth wheel for speed and distance; (2) voltmeter, for mph; (3) burette, constant speed fuel mileage (4) brake decelerometer; (5) brake applicator, used with decelerometer; (6) compressed air tank, for brake applicator; (7) potentiometer, for temperature; (8) selector switch, used with potentiometer; (9) anemometer, for air velocity and temperature; (10) volt-ohm-ammeter, for checking circuits; (11) aneroid barometer; (12) d-c ammeter; (13) ignition timing light; (14) relative humidity meter; (15) compression gage; (16) pressure gage; (17) vacuum gage; (18) pressure gage; (19) pyrometer; (20) thermometer; (21) sling psychrometer, for vapor pressure; (22) psychrometer, similar



United Press

to (21); (23) tire pressure gage; (24) anemometer; (25) a portable electronic temperature indicator; (26) electric tachometer and vacuum gage. Chief Chevrolet experiment engineer Russ Sanders is shown with the instruments.

News of the AUTOMOTIVE



BOEING BLOWER

A new 36,000 hp Westinghouse motor, top, has been installed in the supersonic wind tunnel at Boeing Airplane Co. With the old motor, below, a total of 54,000 hp is available at the two-stage 72-blade fan. Test section measures 8 by 12 ft.

Choremaster Division Sold

Weber Engineered Products, Inc., a new Cincinnati, O., company, has acquired Choremaster Div. of Lodge and Shipley Co. Principal products of the new company will be the Chore-

master garden tractor and accessories. It also will produce transmissions for Sears Roebuck & Co., tank parts and gun mounts for Willys-Overland, and landing gear parts for Cleveland Pneumatic Tool Co.

Bendix Starts Computer Division

Formation of the Bendix Computer Div. of the Bendix Aviation Corp. with headquarters at Hawthorne, Calif. was announced recently by the company. The new division is being formed for the perfection and manufacture of digital computers designed to deal with specific computing problems raised by scientific advances in various industries, in colleges and universities and in the armed forces.

Palmer Nicholls, vice-president of Bendix Pacific Div., will be general manager of the division and will be assisted by Maurice W. Horrell, former executive engineer of the Bendix Research Laboratories in Detroit.

Ensign Expands

To further meet the increased demands for Ensign carburetion equipment for natural gas and propane, Ensign Carburetor Co. announces the purchase of a five-acre site east of Los Angeles, Calif., for a new factory and laboratory. Newly developed laboratory equipment for complete studies of LP gas behavior and utilization will be relocated at the new plant site.

Detroit Plants Move

Steel City Testing Machines, Inc., announces that the company has moved from 8843 Livernois to a new and more extensive plant located at 8817 Lyndon Ave., Detroit 21. This move was necessitated by a largely increased volume of business which has caused present facilities to be entirely outgrown. The new plant is considered a model for production efficiency, and will double the company's present capacity.

Schmieg Industries, Inc., moved into a new and larger plant in December, located at 23930 Sherwood, Detroit. The new plant will have 50 per cent more floor space than the old one.

Schmieg engineers and manufactures the Centri-Merge wet type of dust collectors, spray booths, mechanical washers, production finishing systems, industrial ovens, sheet metal equipment and accessories.

1952 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

	December 1952	November 1952	December 1951	Twelve Months	
				1952	1951
Chrysler	17,828	10,855	7,825	120,678	163,825
De Soto	12,907	10,389	8,880	97,556	120,755
Dodge	37,735	27,893	16,803	289,519	321,655
Plymouth	64,916	48,457	32,652	474,636	622,601
Total—Chrysler Group	133,386	96,574	63,660	1,016,251	1,228,536
Ford	91,994	65,234	48,443	771,531	900,770
Lincoln	3,131	2,150	856	31,992	25,366
Mercury	23,120	22,381	7,756	195,261	236,854
Total—Ford Group	118,245	89,765	55,057	998,784	1,165,010
Buick	16,790	28,516	20,961	321,048	404,095
Cadillac	6,135	6,024	5,066	96,851	103,272
Chevrolet	46,869	90,505	64,949	877,950	1,118,101
Oldsmobile	18,105	19,425	14,137	228,452	285,634
Pontiac	20,239	14,877	19,601	277,106	343,795
Total—G. M. Group	118,127	159,147	124,634	1,801,467	2,255,497
Kaiser-Frazer Group	8,002	7,342	3,268	74,852	99,339
Hudson	6,546	5,121	4,527	76,346	83,327
Nash	14,534	16,894	11,694	152,141	163,533
Packard	9,078	5,129	4,341	62,820	76,075
Studebaker	9,090	20,254	13,910	161,520	222,030
Willys	5,283	4,768	2,775	54,630	29,727
Total—All Makes	420,388	403,814	283,956	4,398,811	5,333,144

AND AVIATION INDUSTRIES



United Press

White Moves Sterling to Cleveland

Operations of the Sterling Div., builders of heavy-duty special purpose trucks, are being moved to Cleveland, O., from Milwaukee, Wis., according to White Motor Co. White acquired control of Sterling last year, and is making extensive model changes. Sterling occupied 235,000 sq ft of floor space and employed 300.

Ferro Buys Foundry

Ferro Machine & Foundry Co. has purchased John Harsch Bronze & Foundry Co. for an estimated \$1.5 million. Ferro is a large producer of gray iron castings, and Harsch makes large aluminum, brass and bronze castings. Both are in Cleveland, O.

Fenn Expands

A \$1.25 million aircraft parts plant in Newington, Conn., will be built for the Fenn Manufacturing Co. of Hartford. The new plant, scheduled for completion early in the fall of 1953, will manufacture rotor heads and transmissions which will be installed in Sikorsky helicopters. The firm estimates that production of these parts will be doubled when the 72,000-sq-ft plant is completed.

Wisconsin Produces Two-Millionth Air-Cooled Engine

Wisconsin Motor Corp., Milwaukee, Wis., during November built air-cooled engine No. 2 million. Seventeen years were required to produce the first million Wisconsin air-cooled en-

gines, and only five years were needed to turn out the second million. According to officials of the company, present indications point to production of the third million within the next four years or less. Currently, a plant expansion program is well under way, involving an expenditure of \$350,000, to provide an additional 41,000 sq ft for a new experimental laboratory and storage space. Including the present new construction, the plant will have a total floor space of 291,000 sq ft, devoted exclusively to the manufacture of air-cooled engines of three to 30 hp.

THREE-WHEELER

Shown at the Italian Motorcycle Show, this tiny model built by Issi will carry 200 lb in addition to the driver. The one-cyl engine is said to give a speed of 50 mph.

Fram Announces Institute of Filter Research

Fram Corp. announced recently the establishment of a new division of the company—the Fram Institute of Filter Research-Engineering.

The new division, to be located at Dexter, Mich., will be under the direction of Dr. William S. James, vice-president and director of engineering and research. Fram is now constructing a new engineering and research laboratory adjacent to its dust tunnel facilities at Dexter. The building will house the Fram research-engineering institute, and also the corporation's air filter engineering department.

GE Lockland Plant Renamed "Evandale"

General Electric Co. has changed the name of its jet engine manufacturing plant near Cincinnati, O., to the Evandale plant. For four years the facility has been known as the Lockland plant and the change is being made to conform with a change of name of the area where the plant is located to Evandale, which was incorporated about 18 months ago.

(Turn to page 156, please)

1952 MOTOR VEHICLE FACTORY SALES*

	Passenger Cars	Trucks	Buses	Totals	
				1952	1951
January.....	273,122	101,510	778	375,410	608,633
February.....	333,224	101,367	625	435,216	618,321
March.....	372,440	109,964	569	482,973	705,022
April.....	415,357	113,631	56	529,555	639,272
May.....	397,496	106,008	423	503,917	652,727
June.....	407,962	110,264	464	518,710	617,685
July.....	188,327	43,231	224	231,782	492,316
August.....	216,577	52,056	346	270,962	549,707
September.....	430,367	112,375	387	543,129	478,002
October.....	471,808	132,064	399	604,271	626,446
November.....	405,111	114,106	319	519,536	450,266
Total—Eleven Months.....	3,901,611	1,096,576	5,144	5,003,331	6,384,606

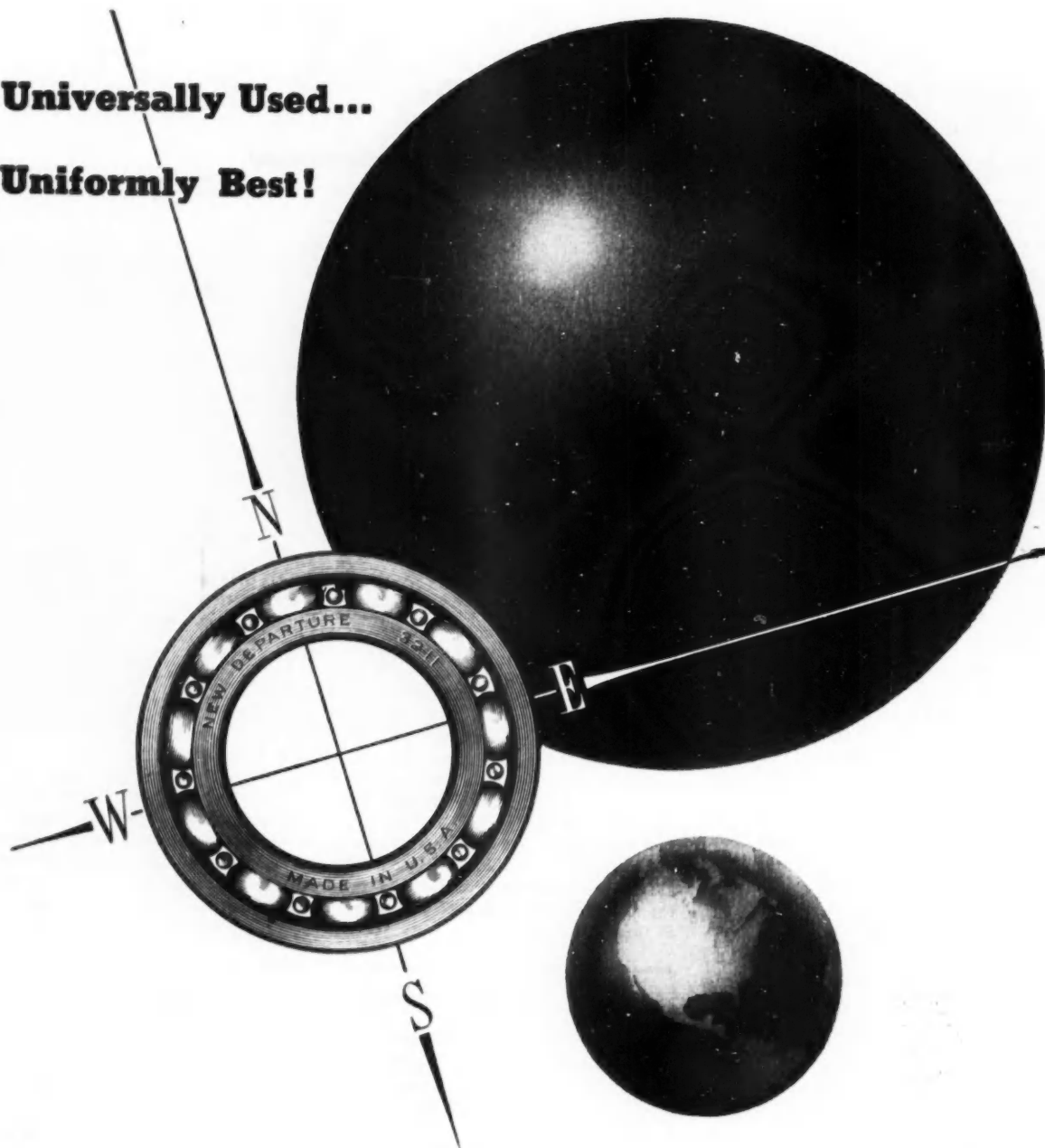
1952 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-18,000	18,001-26,000	26,001-36,000	36,001-48,000	Over 48,000	Total
January	35,577	17,832	5,914	22,409	6,388	9,178	4,234	101,510	
February	35,116	18,114	6,251	23,270	5,149	9,132	4,327	101,367	
March	39,512	19,452	5,657	24,347	5,692	10,076	5,028	109,964	
April	44,191	22,313	5,670	21,959	4,604	10,062	4,832	113,631	
May	40,360	22,934	5,670	19,243	4,326	10,033	3,434	106,008	
June	44,126	23,756	5,373	19,994	4,242	9,964	3,810	110,264	
July	15,950	8,530	1,897	7,010	1,502	5,060	3,273	43,231	
August	22,761	9,363	2,057	7,622	1,352	6,177	2,724	52,056	
September	51,797	22,305	3,664	17,846	3,416	9,735	3,422	112,375	
October	62,480	26,374	5,305	21,205	3,437	9,844	3,719	132,064	
November	56,428	21,130	4,176	17,473	2,904	8,668	3,427	114,106	
Total—11 Mos. 1952	448,268	212,102	52,042	202,386	42,992	98,536	42,230	1,096,576	
Total—11 Mos. 1951	598,969	244,993	93,942	259,565	64,178	73,323	39,007	1,331,767	

* Automobile Manufacturers Association.

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● Sixty years of research, engineering and production experience back up the New Departure name. Whether it's a jewel-like instrument bearing, or a giant, New Departure can build it best!

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Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers



Stewart-Warner Corp.—William E. Judd was promoted to assistant to the president.



Nash Motors Div.—Morgan J. O'Connor has joined the firm as a director of public relations.



Champion Spark Plug Co.—George M. Galster is manager of the new service department.

Purolator Products, Inc.—James D. Abeles has been promoted to executive vice-president.

Chrysler Corp.—James W. Shank and Robert Anderson were named assistant body engineers in the Engineering Div. recently.

Clearing Machine Corp.—Erwin J. Baumrucker is now executive assistant to the executive vice-president.

Alloy Casting Institute—Ernest A. Schoefer now fills the newly-created position of executive vice-president.

Doehler-Jarvis Corp.—John W. Thees has been transferred to Toledo, O., as works manager of plant No. 1. Charles I. Hodgson is now manager of plant No. 2.

Caterpillar Tractor Co.—Karl L. Mason is now assistant research director, and Norman E. Risk and Richard S. Frank are assistant chief engineers.

Clevite Corp.—Sydney L. Hall has joined the firm as vice-president, administration.

Ford Motor Co.—Marvin L. Katke was appointed assistant group executive of the aircraft engine, tractor and machined products group. He is succeeded as general manager of the automatic transmission division by John B. Lawson.

Plymouth Div. of Chrysler Corp.—Dan A. Ringis is now plant manager of the Los Angeles, Calif., plant, succeeding C. C. Rowles, who is now on the Plymouth operating staff.

Le Roi Co.—C. H. Bouvy has been promoted to chief design engineer.

National Automotive Fibres—Philip E. Church has been elected a vice-president of the subsidiary, Canadian Automotive Trim, Ltd. He is operating manager and a director.

Four Wheel Drive Auto Co.—G. F. DeCoursin has been promoted to general sales manager.

Consolidated Vultee Aircraft Corp.—Frank W. Davis has been named to the engineering staff, and is succeeded as assistant chief engineer for research and development in the San Diego, Calif., division by Ralph L. Bayless.

Chrysler Corp.—A. H. Kibiger has joined the company as head of a studio in advance styling.

Kaiser-Frazer Corp.—The appointment of Arthur V. Fant as chief tooling engineer for the aircraft division has been announced.

Minneapolis-Honeywell Regulator Co.—Haywood W. Henderson has been promoted to manager of aeronautical engineering planning.

General Tire & Rubber Co.—Paul E. Nelson is now manager of fleet and national sales.

Solar Aircraft Co.—Arthur P. Brown has been appointed comptroller of the San Diego, Calif., plant.

Northrop Aircraft, Inc.—Barton Tyler has been appointed executive assistant to the administrative head of the special weapons division.

ACF-Brill Motors Co.—Leonard M. Sundquist is now controller and assistant treasurer of the Hall-Scott Motor Div.

Allis-Chalmers Mfg. Co.—William E. Buchanan, president of the Appleton Wire Works, was elected a director recently.

Lincoln-Mercury Div., Ford Motor Co.—Appointment of Frederick S. Strong III as manager of the purchase analysis department has been announced.

Carboloy Dept. of General Electric Co.—Frank A. Thorn has been appointed supervisor of employee services, and Melvin M. Connolly was named labor relations manager.

AiResearch Mfg. Co.—Helmut Schelp was named to investigate and screen new products for manufacture. W. T. von der Nuell was appointed senior project engineer.

Necrology

William J. Maguire, general production manager of the Chrysler Corp. Jefferson Ave. plant, died at his home in Detroit on Dec. 18.

Jervis B. Webb, 62, founder of the Jervis B. Webb Co. and the Huron Forge and Machine Co., died Dec. 21 at his home in Birmingham, Mich.

Harvey D. Geyer, 61, retired chief engineer of the Inland Mfg. Div. of General Motors Corp., died Dec. 21 at Dayton, O.

Theodore Mungen, 72, retired department manager with the Budd Co., died Dec. 21 at Philadelphia, Pa.



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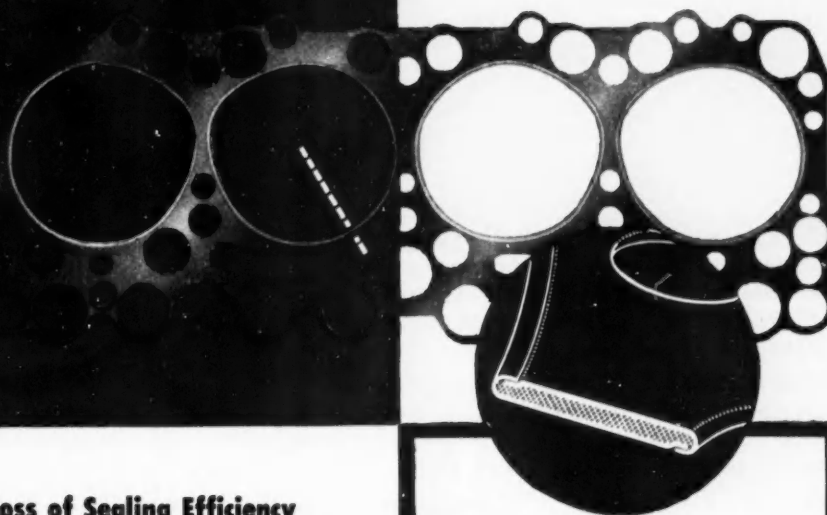
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to .030

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Metal-Asbestos Cylinder Head Gaskets



25% Thinner — No Loss of Sealing Efficiency

Now available in reduced thickness from their former .040 compressibility limit, VIC-2-FOLD gaskets meet your specifications for highest compression ratio engine design.

Compressible to .030, this thinner gasket retains all features of VIC-2-FOLD construction as described at right. Similarly it retains all recognized superior sealing characteristics of metal-asbestos gasket structures.

Perfect Replacement for Beaded Steel

Designers will find this new VIC-2-FOLD ideal for replacement or specification change on engines where heretofore only thin beaded steel gaskets were available. Get complete details from your Victor Field Engineer or by direct inquiry.

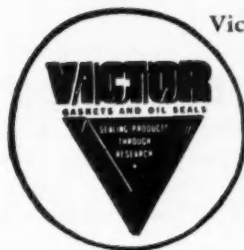
The Only Positive Sealing Gasket for Modern H.C. Engines

VIC-2-FOLD is the only thin gasket compressible to .030, combining the recognized advantages of copper-steel-asbestos construction.

Note how the high strength of steel is utilized in bottom layer. Combustion openings are turned up, overlapping top copper layer for strong protection against breakdown and blowout.

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Compressibility is precisely controlled by the use of finest long fiber asbestos millboard, milled in Victor's own plant.



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with production requirements up to 12 barrels per hour!



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HP RIFLE BROACHING MACHINE

Large coolant reservoir
Magnetic filters
Sufficient pressure range
(up to 1200 pounds)

Built with a fully automatic high pressure coolant system, this LAPOINTE-engineered HP type BROACHING MACHINE provides the **best possible surface finish** . . . and with one-man operation!

This machine is easy to load and unload, and economical to operate because it is practically automatic. Interlocking controls prevent malfunctioning. Versatile cutting speeds, ranging up to 30 fpm.

Close-up view of Lapointe-designed fixtures, broaches, gun barrel, and non-ferrous tube for automatic broach return. Each broach has a pilot section, to follow previous cut.

Write for Brochure: HP-40-10



THE

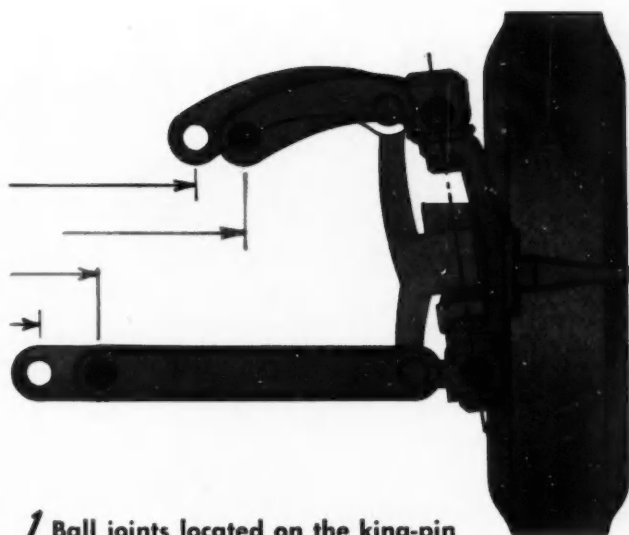
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THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



- 1** Ball joints located on the king-pin line move inner pivots outward, creating extra inches under the hood for wider engine design.

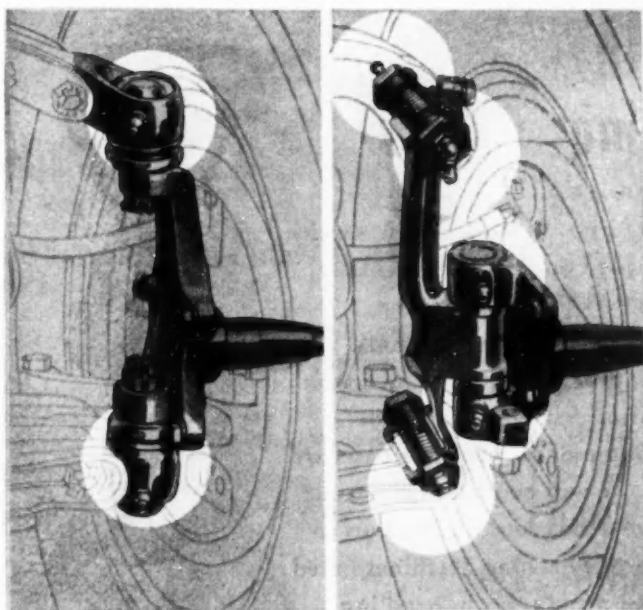
Ball Joint Suspension

- 2** REDUCES LUBRICATION SERVICE 75 PER CENT
3 MAKES FRONT WHEEL SUSPENSION INSTALLATION EASIER AND FASTER

ONE GLANCE at the illustrations and you see how valuable inches are saved under the hood! Quick comparison points out the number of lubrication services eliminated. But these are only small points in the over-all story.

Thompson's Ball Joint Suspension also eliminates front suspension bind. It improves steering; makes handling easier; and prolongs service life. Through weight savings, parts reduction and compact design, Ball Joint Suspension speeds assembly. And in servicing, the equivalent of a complete rebushing job can be done in half an hour because removal of front wheels and bushings, bleeding the braking system and normal realignment are unnecessary.

Let Thompson's "ENGINEERED STEERING" experts help you solve your steering problems. Inquiries from all automotive makers are welcome at Thompson's Detroit Division. Call us at WA 1-5010.



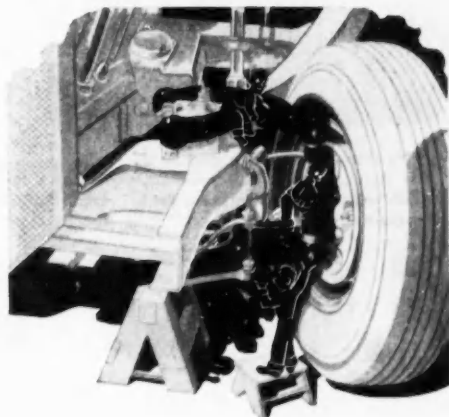
- 2** Lubrication points are reduced from 12 to 4 by eliminating upper and lower standard threaded bearings, knuckle support, king-pin and its bushings.

- 3** Only three simple operations are required to assemble or remove the compact service package from the suspension.

Thompson  **Products, Inc.**

DETROIT DIVISION

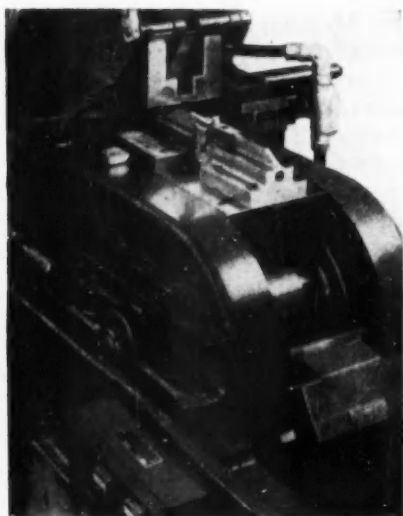
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• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Cutting tool maintenance costs are low. We will be glad to make our recommendations on Footburt Surface Broaching Machines based on our many years in handling similar work.

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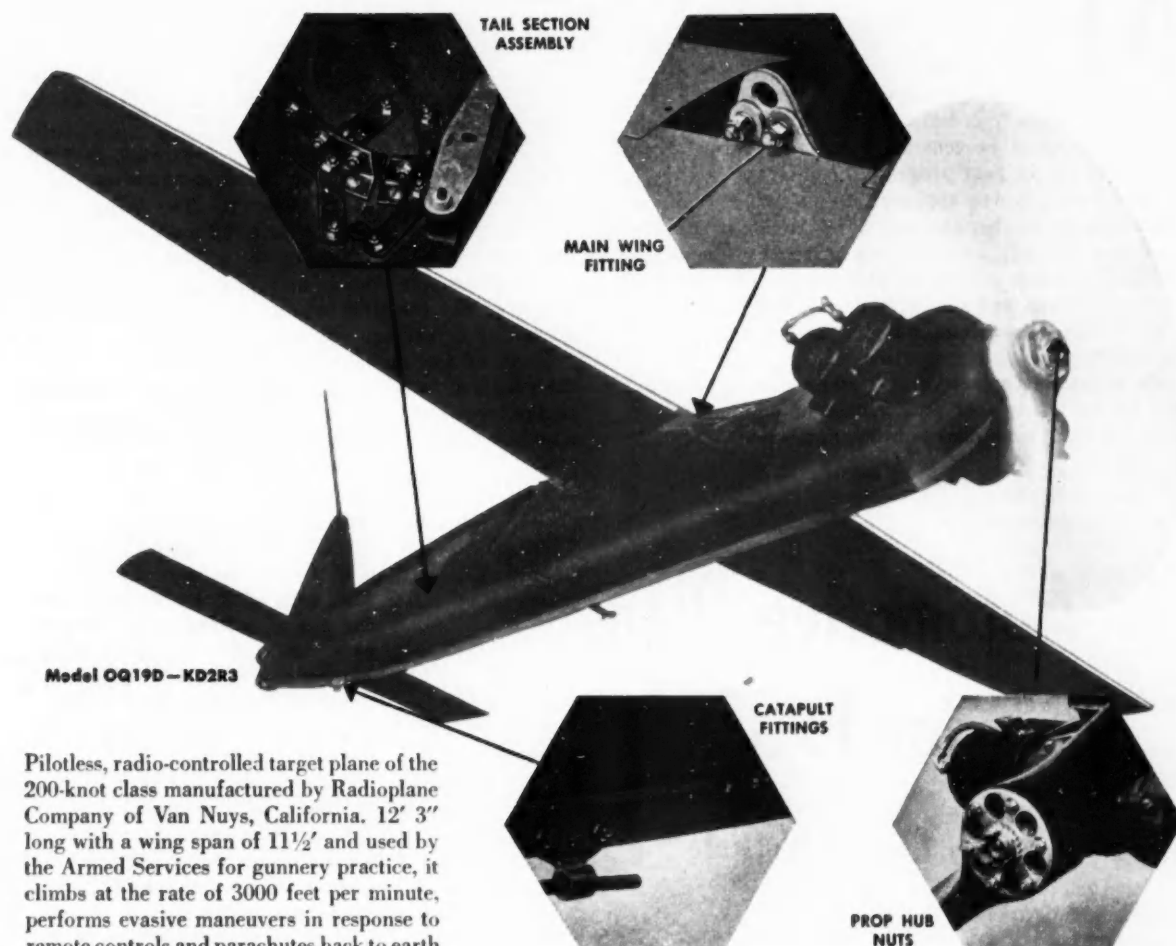
Detroit Office: General Motors Building



FOOTBURT

machine tools

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Model OQ19D-KD2R3

Pilotless, radio-controlled target plane of the 200-knot class manufactured by Radioplane Company of Van Nuys, California. 12' 3" long with a wing span of 11½' and used by the Armed Services for gunnery practice, it climbs at the rate of 3000 feet per minute, performs evasive maneuvers in response to remote controls and parachutes back to earth for recovery.



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hold tight against stress and vibration
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MOVING into 1953, the automobile industry certainly has a much more optimistic outlook than it had a year ago—better, in fact, than at any time since the beginning of 1950.

Whereas a year ago the industry was looking forward with some trepidation to uncertainties and Government production controls that might grow more restricted as the year progressed, exactly the opposite is true now. It was apparent in the dying weeks of 1952 that production controls were slated for the discard and the only question was when they would be dropped. It now appears that controls will continue to grow weaker, and should be removed entirely sometime within the second quarter except for critical materials of defense production.

As always, estimates of how many cars and trucks will be built this year is a matter of opinion, but a pretty general consensus puts the number at 5.4 to 5.5

million cars and 1.4 million trucks. Some figures are lower than this estimate and others a little higher, but it represents a pretty fair average.

One thing the entire industry is agreed on is that 1953 will be a very competitive selling year. Despite the fact that production was curtailed last year about 19 per cent under 1951, there at no time was any evidence of a runaway market or a shortage of cars or trucks. With about one million more cars slated for production this year, it is obvious that dealers are going to have to do intensive selling and trading to move that volume, but the industry is confident it can be done. There are about 14 million prewar cars still in use and with the scrappage rate running about 3 million units a year there is a very definite replacement market for these vehicles. When that is coupled with normal turnover and sales to new buyers the industry feels that the business is there if their dealers go after it. Also, total cars in use now stands at near 42 million, swelling the replacement market.

The question of car prices appears to be definitely

settled, at least at the year's outset, with most companies holding the line at 1952 levels. Actually, it is probable that retail prices will be academic later this year when production hits full stride, with the actual price to the buyer settled by dickering and trading, with the sale in many instances going to the dealer who will give the best deal.

Looking back on 1952, the only conclusion possible is that despite all of the difficulties it was a very good year for the automobile industry. The latest unofficial estimate of production is 4.332 million passenger cars and 1.222 million trucks, for a total of 5.554 million vehicles, the fourth best year in history. The year's output certainly was ahead of most estimates prevailing a year ago.

Many of the problems which were serious during the year had been largely overcome by year-end, such as the copper shortage and the pinch in steel. Also, a notable feat was the ability of the industry to build within a few thousand of its full quota of cars allotted by NPA despite a long interruption caused by the two-months steel strike. The fourth quarter closed on a high note, with the industry turning out an estimated 1.64 million cars and trucks, the second highest fourth quarter in history.

During the year the industry also fairly well completed its tooling program for defense work and in many plants had started production of defense goods in fairly substantial volume. There are, of course, some projects still in the tooling stage but most of that phase now is finished.

Much of the confusion and uncertainty existing a year ago about the impact of defense work on automotive production has been dissipated and the industry now has a fairly clear picture of where it's going in that respect. Defense production goals have been pretty well defined and the so-called stretch-out will mean a smaller percentage of materials siphoned away from civilian production than originally had been planned. Coupled with this favorable factor is the healthy increase in steel production capacity that has already come in during the past year or is slated to materialize soon. As a result, it now looks as though sometime during the second quarter there will be ample steel for all of the industry's needs.

Another favorable factor for the industry this year is the much healthier political climate resulting from the November elections. It is confidently expected that business will not be hampered with unnecessary controls and the outright opposition that characterized the previous administration. Greatly improved labor relations and collective bargaining also are expected to result from the demise of the alliance between Big

Automotive Plans for 1953

By Leonard Westrate

Automotive Data 1950-52

	1950	1951	1952†
Factory Sales—Number*			
Passenger Cars	6,665,863	5,336,935	4,332,000
Trucks and Buses	1,337,193	1,428,328	1,222,000
Total	8,003,056	6,765,263	5,554,000
Factory Sales—Wholesale Value			
Passenger Cars	\$ 8,633,272,000	\$7,371,207,000	\$6,600,000,000
Trucks and Buses	\$ 1,747,480,000	\$2,366,047,000	\$2,400,000,000
Total	\$10,380,752,000	\$9,737,254,000	\$9,000,000,000
Replacement Parts and Accessories, Domestic Market—Wholesale Value*	\$2,139,734,000	\$2,543,841,000	\$2,450,000,000
Gasoline Consumption—Thousands of Gallons	35,652,940	38,128,351	40,000,000
Vehicle Miles of Travel—Billions of Miles			
Rural	235	253	260
Urban	223	230	240
Total	458	483	500
Motor Vehicle Exports			
Passenger Cars	152,925	246,947	200,000
Trucks	150,760	223,602	165,000
Total	303,685	470,549	365,000
EMPLOYMENT			
Production Workers	713,500	718,400	640,000†
All Employees, Including Salaried	839,400	856,300	785,000†
Annual Payroll			
Production Workers	\$2,717,722,000	\$2,821,186,000	\$2,600,000,000
Special Taxes on Motor Vehicles			
All Vehicles	\$4,359,361,000	\$4,708,227,000	\$5,000,000,000
Motor Trucks	\$1,217,203,000	\$1,311,035,000	\$1,450,000,000
Highway Expenditures—All Roads and Streets			
Capital Outlay	\$2,312,000,000	\$2,581,000,000
Maintenance, Administration, Interest	\$1,849,000,000	\$1,954,000,000
Total	\$4,161,000,000	\$4,535,000,000	\$5,100,000,000

Motor Vehicle Registrations, December 31 (Including Publicly Owned)

	Passenger Cars	Trucks and Buses	Total
1950	40,333,591	8,861,621	49,195,212
1951	42,682,591	9,266,215	51,948,806
1952†	43,894,000	9,469,000	53,363,000

* Includes Military. † Estimated.

† Employment figures given above for 1952 are misleading in that they represent average and reflect heavy layoffs caused by the steel strike. Actually on December 1, all employees totaled 900,000, an all-time high.

Source: Automobile Manufacturers Association.

more will be announced later, although not of the magnitude of recent years.

General Motors is going ahead with its 1.250 million sq ft dual-purpose plant at Arlington, Texas, for its BOP division. Aircraft work originally scheduled for the plant has been cancelled, but the dual purpose nature will be retained. The unit is slated for completion by early fall and will have a maximum rate of 35 cars per hour when no defense activity is involved.

Buick is completing a large expansion program to take care of war work and eventually to be used for automotive production which will give the division a capacity of 750,000 cars a year.

Cadillac also is planning a 25 per cent increase in capacity over the next couple of years. It is reported that a new plant is under consideration but size or location have not been divulged.

GM also has some smaller expansion projects under way, including a new West Coast battery plant and a 25 per cent expansion of capacity at Moraine Products Div.

Chrysler is tooling its new large manufacturing plant near Indianapolis and should get into volume production by mid-year. It also is extending its Dodge assembly plant at San Leandro, Calif., by 68,000 sq ft.

(Turn to page 124, please)

Labor and Big Government existing for 20 years.

Although the major expansion activity of the industry has been fairly well completed in the postwar period, the industry still will undertake some further building of new plants and modernization during the coming year. Several are currently under way and

Dodge Tools Up Three Lines for Cylinder Head Production

By Thomas Mac New

CURRENTLY, there is one complete, cleverly laid out production line in operation for the mass manufacture of the new Dodge 140-hp, V-8 engine cylinder heads, and machinery is on order to complete two more cylinder head lines. When the production plans are ultimately completed, the three lines will have a daily scheduled output of about 4800 heads. In addition to building many of the machine tools that are necessary for the machining operations on the Dodge V-8 engine block (AUTOMOTIVE INDUSTRIES, December 1, 1952), the Dodge Div., Chrysler Corp., built and erected some of the modern machine tools that have been installed for cylinder head production.

For the first machining operation along the modern cylinder head production line in the Dodge main plant, a Cincinnati horizontal broaching machine has been set up. In this machine broaching operations are carried out on the top face, intake manifold face, transfer ledge, bottom surface and exhaust manifold face.

The workpiece is located in the 600-hp broaching machine by two exhaust ports and two intake ports to control stock being broached from the top and bottom surfaces. It is next located in two cored holes to control the stock that is machined from the exhaust and intake manifold pads.

Hydraulically operated work holding fixtures and a unique turn-over device are features of the Cincinnati broaching machine that removes approximately seven lb of metal per head per pass and has a production rate on the order of 150 cylinder heads per hour. All broaches are equipped with tungsten carbide cutting tools. The top surface of the intake manifold face and transfer ledge are finished broached at the first station. At the second station, the part is rolled over, and the bottom face and exhaust manifold face are finished broached at station No. 3.

Next the cylinder head goes to a

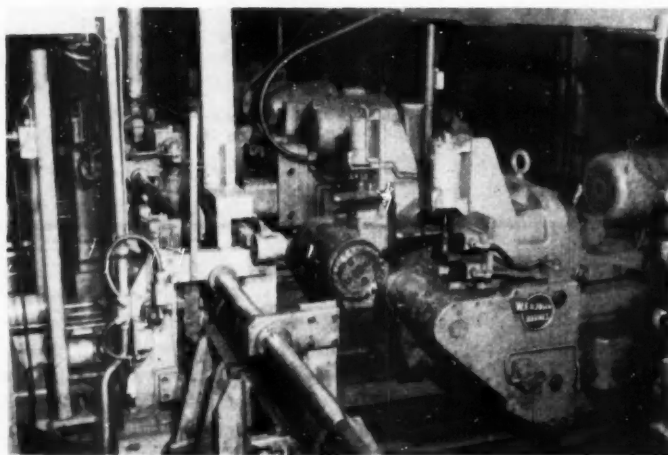
W. F. and John Barnes multi-station transfer machine. This 15 station machine tool mills the pads on the ends of the head; drills stud holes; and reams, counterbores, drills, core drills, and countersinks spark plug holes. It also drills two holes in the intake manifold pad. The workpiece is loaded with the bottom face at the left hand side and with the intake manifold up.

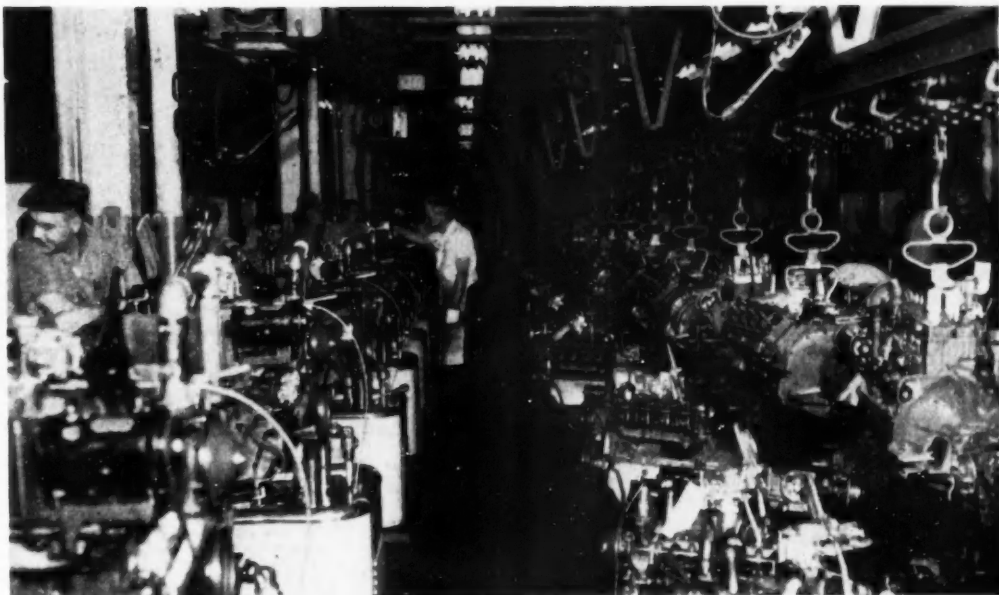
A Cincinnati eight-spindle generating mill is utilized for machining the hemispherical combustion chambers in the Dodge cylinder head. Since Dodge could not obtain rapid delivery of this unit due to defense tooling on order, the division built and erected the mill in cooperation with Cincinnati engineers.

Another W. F. and John Barnes transfer machine is brought into play for a subsequent operation on the head. Here, this 22-station, high-production unit works on the intake valve guide holes, spring seats, manifold pads, spark plug holes, an oil hole, and all other holes on the top face and both ends.

At the first station in the Barnes machine, the part

Three W. F. & John Barnes machines are used to perform a number of operations on the cylinder head. The machines pic-



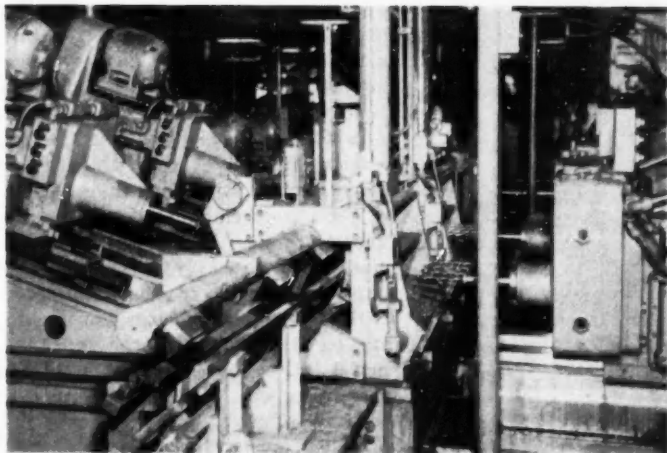


Engines are tested on the dynamometer lines at left and right. Engines lined up in the center have come from assembly and are waiting to be tested. Overhead conveyors above each dynamometer line remove the tested engines after the 20 min test period. During this test, all phases of engine operation are checked. An engine can be removed from the test stand only by an inspector who carries the keys to the dynamometers, thus assuring quality control.

is loaded with the top face to the left hand side, intake manifold pad up and the centerline of the intake valve holes horizontal. Machining at the second station, by the left hand side, is performed on the bottom face of the cylinder head where one, $\frac{1}{4}$ -in. diam hole is drilled to $\frac{2}{3}$ depth. The right hand tooling of the transfer unit, meanwhile, drills four, $\frac{5}{8}$ -in. diam holes to $\frac{1}{2}$ depth for the 0.687 in. intake valve guide holes. The $\frac{1}{4}$ -in. hole, previously drilled, is finished by the left hand machine head at the third station, and the four $\frac{5}{8}$ -in. diam holes are finished by the right hand tooling.

After leaving an idle station, No. 4, the workpiece

tured here are tooled to mill the cylinder head ends, drill water holes, oil holes, valve guide holes and dowel holes.



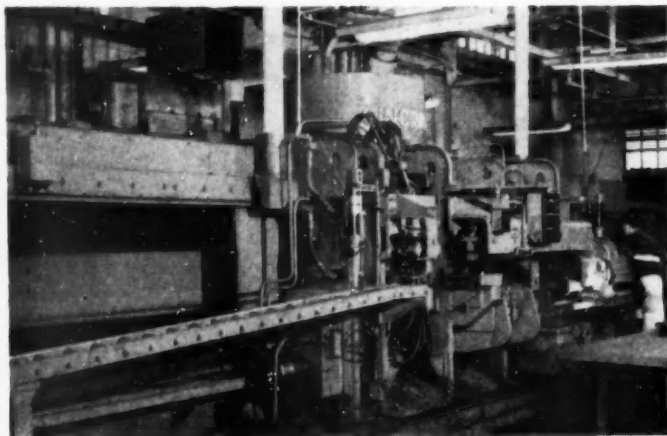
has four $1\frac{3}{8}$ -in. diam holes bored in the bottom surface for the intake valve throats, and four $1-25/64$ -in. diam holes are counterbored in the top face for the intake valve guide spring seats at No. 5 station. At the sixth station, four 28 deg tapers are machined and a hole is counterbored in the bottom face by the left hand tool while four intake valve guide holes are reamed by the right hand head.

Another idle station is encountered at No. 7, and the part is rotated for chip removal and then repositioned with the top surface up and the centerline of the exhaust and intake holes horizontal at the eighth station. Both the left and right hand sides of the machine are used for checking the depth of drilled holes at station 9. Proceeding to station 10, eight holes are tapped to $3/8-16$ on the intake side and two holes are tapped on a 25 deg angle. The right hand tooling taps eight holes on the exhaust side. Scully-Jones compression type tap holders are utilized for many of the tapping operations throughout the complete machining of the cylinder head.

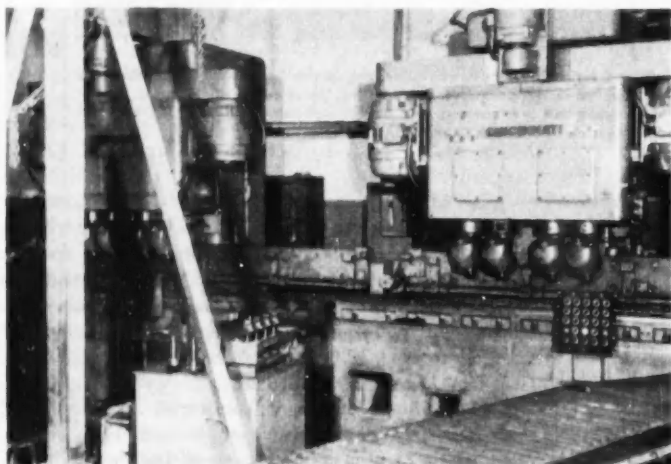
Next, at station 11, the left hand side of the machine taps four spark plug holes and six other holes, while the right hand side remains idle. At the succeeding station, the head is rotated so that the joint face is up and the exhaust port side is in the direction of progress. Two $5/16$ -in. diam holes are tapped at station 14, and four more are tapped at No. 15. After being idle at the subsequent station, chamfering operations are carried out on the two,

5/16-in. diam holes at station 17. Similar chamfering procedures are performed at the next station on four holes, and then the part moves into an idle spot at station 19. Further tapping is done on six holes at stations 20 and 21, and the part is unloaded at 22.

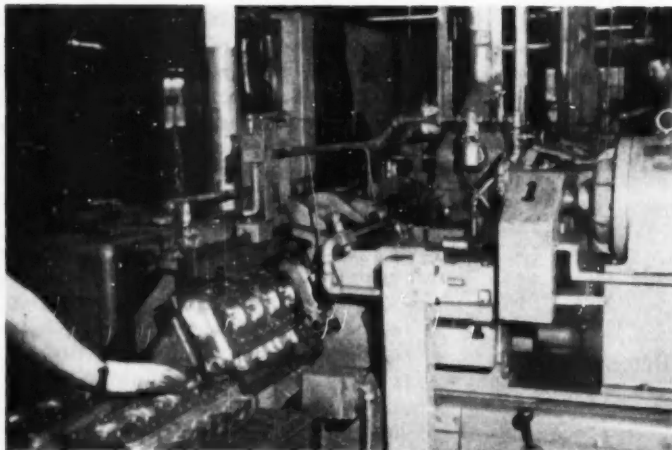
For the first machining operations along the well equipped cylinder head assembly line, a Heald way-type high-precision boring machine, equipped with power transfer, is utilized. At the first station, the head is loaded into the machine and located by means of two dowel holes in the bottom face. The four exhaust valve stem guide holes are semi-finished bored and chamfered on a 45 deg angle, and the pocket diameters are bored at the second sta-



Broaching operations on the Dodge V-8 head are performed by this Cincinnati unit which has a production rate of about 150 heads per hour.



An eight-spindle Cincinnati generating mill made by Dodge machines the hemispherical combustion chambers in the cylinder heads.



This Heald machine performs the first set of operations in cylinder head assembly. It drills valve guides, presses them into place, finish bores and reams them and generates valve seats.

tion. Moving progressively down the line, there is an idle station at number 3, while at the fourth station the exhaust valve stem guide holes are finished reamed with tungsten carbide six-flute reamers.

Station 5 of the Heald boring machine is idle, and at the sixth station a $\frac{1}{8}$ in. oil hole is drilled in each valve guide bushing. The bushings are then pressed into place. A four-station hydraulic ram is utilized for this operation. The bushings are fed automatically. Next, a ferris wheel type of fixture is brought to play to tumble the cylinder head. Intake valve stem guide holes are then semi-finished bored, and a 1.541 in. diam recess is counterbored. Number 9 station is idle, while at 10 valve guide holes are finished reamed.

After remaining idle at station 11 in the Heald unit, the intake valve guide bushings are pressed into the workpiece at the next station. The valve guides are precision bored and the 45 deg angle valve seats are generated after the cylinder head passes through another idle station. Once again the head passes through an idle station before further machining. At the 16th station, the intake valve guides are finished reamed using four flute reamers.

Another ferris wheel fixture is then used to tumble the part so that operations can proceed on the exhaust valve guides. The exhaust valve guides along with the pocket diameters are bored at station 18 and then the workpiece moves into another idle station. Finish reaming operations are performed on the guide holes and the part is then unloaded at the 21st station.

The Horsepower Race



Bhp/cu in. Comparison
Selected 1953 Passenger Car Engines

—1953
Version

Make	Type	Displacement (cu in.)	Bhp (max.)	Compression Ratio	Bhp/cu ³ /in.
Lincoln	V-8	317.5	205	8. to 1	0.646
Cadillac	V-8	331	210	8.25 to 1	0.634
Buick (Roadmaster)	V-8	322	188	8.5 to 1	0.584
Dodge	V-8	241	140	7.1 to 1	0.580
De Soto	V-8	276	160	7.1 to 1	0.579
Hudson (Jet)*	L-head-6	202	114	8. to 1	0.564
Willys	F-head-6	161	90	7.6 to 1	0.559
Chrysler	V-8	331	180	7.5 to 1	0.544
Oldsmobile	V-8	303.7	165	8. to 1	0.543
Buick (Super)	V-8	322	170	8.5 to 1	0.528
Studebaker	V-8	232.6	120	7. to 1	0.516

* With Twin-H-Power.

By Joseph Geschelin

ingredients: The first is competition; the other is a torque curve permitting high acceleration rates at around 60 to 70 mph, which should imply greater safety on the highway. The latter feature must be emphasized to the public if the industry is to escape serious criticism and perhaps punitive measures by regulating bodies.

From an engineering standpoint, the new V-8's have delivered

on the earlier predictions that the modern high-compression, high-output engine, taking advantage of accumulated knowledge and combining the highest and best mixture of mechanical and chemical octane ingredients, would be capable of enormous possibilities in power increases without changing basic displacement or construction.

A noteworthy example of this promise is the Chrysler engine. Although it remains rated at 180-hp, a 310-hp version has been in operation for a long time. And in October, 1952 Chrysler unveiled a specially equipped and modified engine—using the same basic structure—in a race car, this version being rated at 400-hp plus. Naturally, both the 310 and 400-hp versions require special fuels quite out of the range of service station fuels. These special engines illustrate the great gains in output possible with a basic engine.

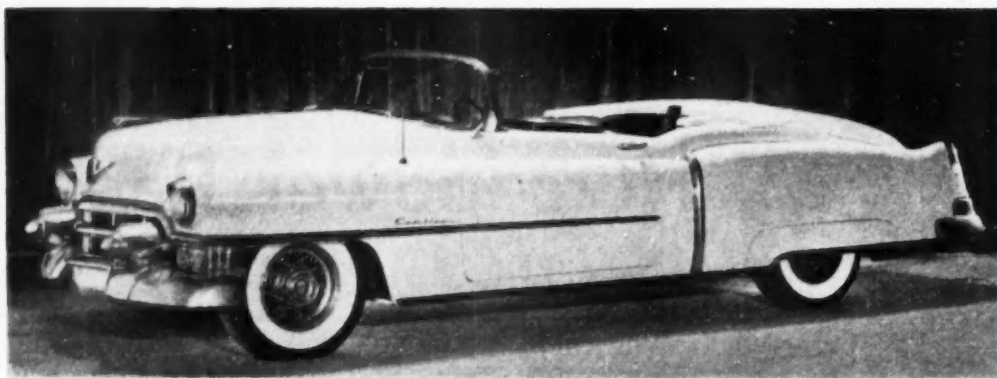
Although last year the V-8's were conservative with regard to compression ratio, ranging around 7.5 to 1 in the main, with 7.6 to 1 for the Willys F-head six, this year many of the companies felt secure in stepping compression ratio to 8 and 8.5 to 1. Since this was done with the knowledge that premium fuel

(Turn to page 100, please)

As predicted last year (see AUTOMOTIVE INDUSTRIES, February 15, 1952) the trend to V-8's in the passenger car field continues with Dodge and Buick added to this year's starters, leaving only a scattered few not yet in the fold. Unquestionably the 90-deg V-8 engine will sweep the industry with few exceptions.

We shall be waiting expectantly for the Pontiac and Mercury overhead-valve V-8's which, we surmise, will be available for 1954. And it should be only a matter of time before Packard and Hudson may follow the trend. Whether this trend will extend to Plymouth and Chevrolet is still a matter for conjecture at this writing, although rumors have been rife as to Chevrolet.

Continuing too—but at an accelerated pace—is the horsepower race. The question uppermost in the minds of many people in the industry is: where is the race leading and when will it stop? The move to these top ratings has been criticized in newspapers on the grounds of safety since to the man on the street as well as to the generous sprinkling of "hot-rodders" it implies still greater road speeds. To the initiated, the enormous power ratings are compounded of two



The Eldorado, a new car in the Cadillac line.

Cadillac Horsepower **HIGH** *At All-Time*

LEADING the Cadillac style parade for 1953 is the distinctive Eldorado convertible which will be produced in limited quantity during the model year. The complete Cadillac line will include the following models, in addition to the Eldorado: Series 62—hardtop coupe; Coupe deVille; convertible coupe; four-door sedan. Series 60 Special Fleetwood sedan. Series 75—eight-passenger and Imperial sedans. The latter model has a hydraulically operated glass chauffeur partition.

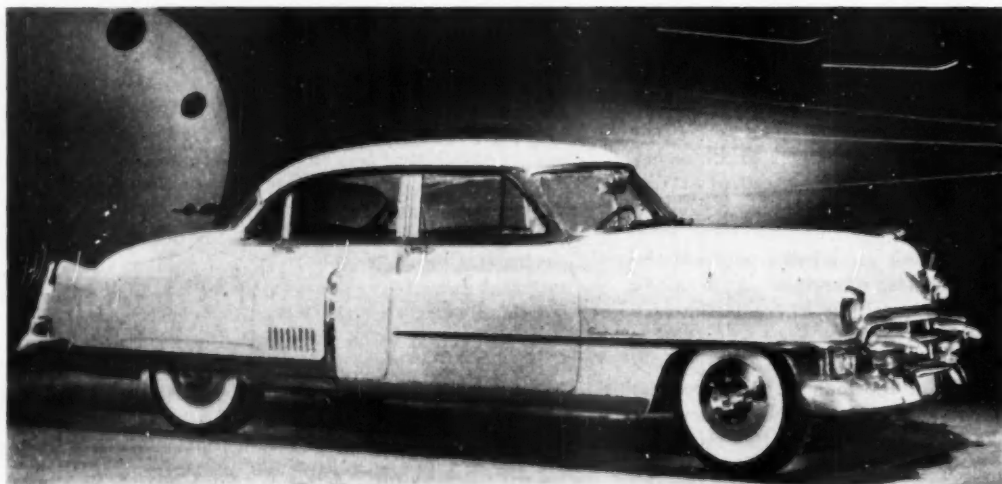
Most outstanding of the mechanical features of the line is found in the engine which has been suitably modified to produce 210 bhp without affecting basic components. In addition to mechanical changes, the engine also has a new 12-volt electrical system.

Other special features include: Saginaw power steer-

ing continued as optional equipment, an improved Hydra-Matic drive, and 12-in. brakes front and rear. For 1953 Cadillac also offers at the owner's option a car air conditioning system developed jointly by Cadillac and Frigidaire. Another optional feature is the now well-known Autronic Eye headlight dimmer.

Chromium-plated wire wheels are standard equipment on the Eldorado, and available at extra cost on the rest of the line. In all, Cadillac provides five different wheel options: chromium-plated wire wheels; solid chrome wheel disks; chromium-plated spoked wheel disks; and chrome trim rings with the standard wheel face and hub cap.

A brief analysis of the simple mechanical changes
(Turn to page 94, please)



For 1953, hoods are wider and front ends are more massive as shown in this illustration of a 60 Special sedan. Note the bullet-type grille guards.



The Series 98 Holiday coupe.

Oldsmobile Ups Horsepower

and Adds 12-Volt System

IN ushering its line of cars for 1953, Oldsmobile offers some important engineering features, including 12-volt ignition on all models, Bendix power brake as optional equipment, Frigidaire air conditioning as optional equipment, and turn signal as standard equipment on all models. G.M. Saginaw power steering and the Autronic Eye, first offered last year, are continued as optional equipment.

Apart from the special items mentioned above, the basic mechanical features and wheelbase remain unchanged, except as noted below. Although engines for the three basic models have not been changed mechanically, compression ratio has been increased to 8 to 1 across the board, lifting the rating on the Super 88 and the 98 to 165 bhp, and to 150 bhp on the Deluxe 88. The new 12-volt electrical system, including an 11-plate, 12-volt battery, has been adopted as standard equipment. As a matter of interest, the vibration damper has been reinstated for 1953.

The setup of models is about the same as before. On the 98, there are a four-door sedan, convertible,

and the Holiday. The Super 88 offers the same types of bodies as well as a two-door sedan. The Deluxe 88 has four-door and two-door sedan models. Basic body styling remains the same but there is distinctiveness stemming from new front end styling, new front and rear bumpers, and handsome interior treatment.

There are some important mechanical details incident to new models. Front tread has been increased to 59 in., from the former 58 in. The front spindle has been changed to accommodate larger diameter front wheel bearings. The rear axle is new, and features a heavier and more rigid housing, heavier pinion shaft and bearing, and a change in axle ratios as follows: with HydraMatic drive, 3.42 to 1 on the 98; 3.23 to 1 on the 88's. With synchromesh transmission the ratio is 3.64 to 1 on the 98 and the 88's.

The Bendix vacuum power brake installation, integral with the master cylinder, is offered as optional equipment. When specified, it carries a wide brake pedal suspended from the dash, arranged in the plane of action of the accelerator pedal, thus permitting an easy swing of the toe from one pedal to the other.

The instrument panel has been completely redesigned, and now includes the HydraMatic transmission shift indicator arranged in a horizontal panel directly below the speedometer dial. This change is responsible for cleaning up the gear shift lever and steering column jacket, producing a pleasing and clean assembly. At the same time the driver can judge his shift position more easily.

Optional on the 98 models is a foam rubber safety

(Turn to page 88, please)

Heavy Press Program

Moves Forward...

ONE of the most interesting projects in the press field, the huge forging and extrusion presses being built for this Nation's defense program, was widely discussed at the American Society of Mechanical Engineers' 73rd Annual Meeting held in New York City last month. In addition to the ASME, the Society of Automotive Engineers, the Institute of Aeronautical Sciences, and the American Institute of Mining and Metallurgical Engineers participated in the technical symposium. Engineers seeking more knowledge of the technical aspects of the press program filled the large meeting rooms to overflowing.

Six technical papers dealing with the subject gave a diversified picture of the current status of press design, ingot casting, production problems, etc. Following are a brief Air Force report on the press program and abstracts and/or extracts of the papers.

PROGRESS REPORT

THE heavy press program is a large scale engineering project sponsored by the U. S. Air Force. Primary goal of this program is to increase aircraft frame production by providing the metal-forming industries with heavy hydraulic die-forging and extrusion presses in various capacities up to 50,000 tons.

New jet and turboprop aircraft designs demand more and more structural members that are comparatively lighter and stronger. These new hydraulic forging and extrusion presses are the answer to this problem since they will permit one-piece units to replace many items that are now fabricated. Not only will these forgings and extrusions achieve added rigidity with less weight but there will be significant savings in material and manhours.

At the present time, the automobile industry is making use of the extrusion technique for items such as window moldings, body trim and tubing components. However, the potential market for a low cost automobile that will combine strength and rigidity with less weight is a basis for believing that automotive engineers and designers may find the new heavy presses to be the means of creating such a car.

The first units to go into operation will be the 35,000 and 50,000 ton die forging presses. Excavation

work for these two presses is practically complete. Press foundations go down 100 ft and the concrete supporting walls range in thickness up to 13 ft. This is believed to be the biggest construction job ever done for this type of industrial equipment. The lower half of these gigantic presses will be suspended in this pit.

The concrete floor for the hydro-pneumatic accumulator station—the power unit—has been poured.

Fabrication and shipment of press components has started and the following items are noted:

1. Four of the nine main cylinders (for the 50,000 ton press) have been forged and are in various stages of machining at the Midvale Steel plant.

2. The first cylinder containers have been cast at Erie and U. S. Steel mills. These castings are in the neighborhood of 35 tons each.

3. First ingots for the press (50,000 ton forging) columns have been poured by Bethlehem Steel. These ingots weighing 700,000 lb and are believed to be the largest ever made. Finished columns will be 110 ft long and will weigh in excess of 320 tons each. The unique features of these columns are the rectangular cross section and laminated construction.

A 20,000 ton capacity horizontal extrusion press is the largest of this type being built. Some idea of its magnitude can be gained from the following figures: length, 210 ft; width, 22 ft; gross weight, 7,000,000 lb.

The castings for the crossheads and platens range in weight up to 175 tons each. This press is designed to extrude structures up to 100 ft long with a cross section of 800 sq in.

The main source of power for these machines is water under a head of compressed air at 4500 psi. The charging of this pressurized fluid in accumulator vessels is accomplished by a series of 1500 hp reciprocating pumps.

Six of these accumulator vessels have been built and shipped to the various press sites. These vessels have a capacity of 350 cu ft each, a wall thickness of over seven in. and weigh upwards of 80 tons.

The execution of the heavy press program is expected to cover a three-year period. Impact of the demand for forgings and castings on the domestic mills, already overburdened, was so great that a number of units were ordered from steel mills in Europe and Japan in order to meet the scheduled completion dates.

Various Aspects Analyzed at New York Symposium

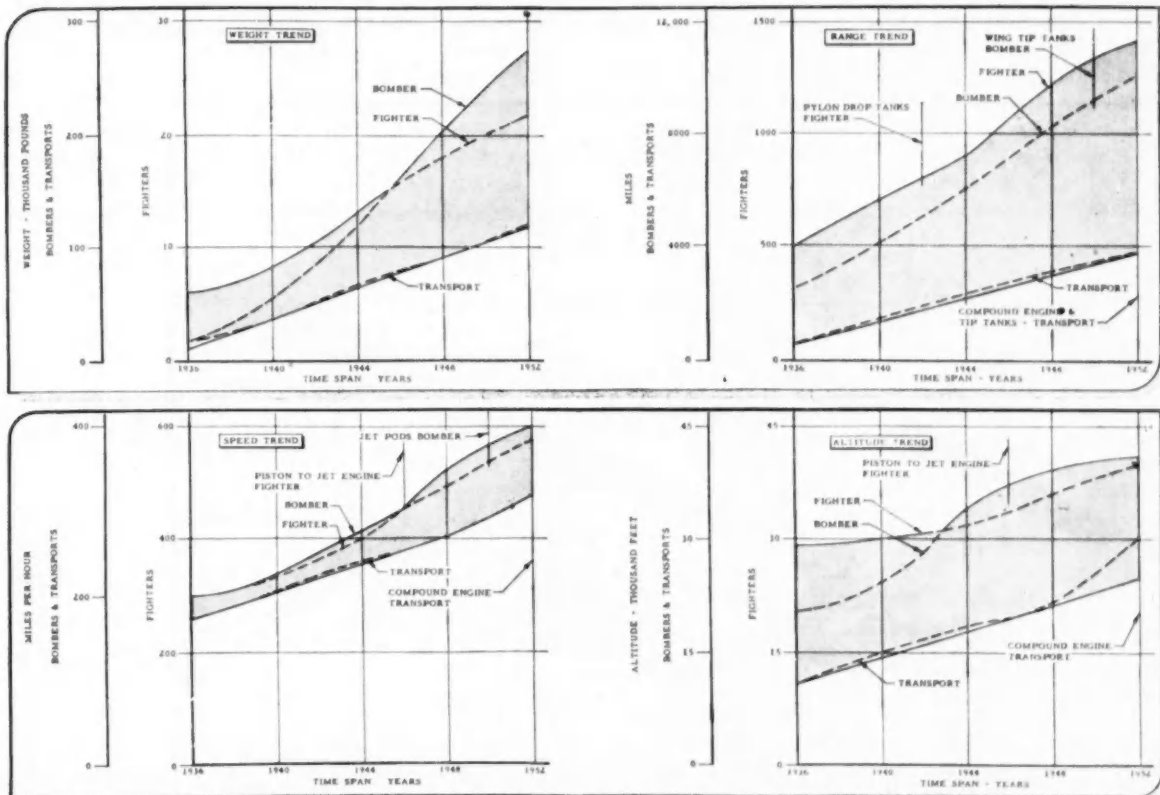
Requirements for Large, Light Metal Forgings and Extrusions in the Aircraft Industry

By George W. Papen
Production Engineering Department Manager
Lockheed Aircraft Corp.

THE conventional airplane structure can be increased in size by splicing on additional parts or by increasing the overall size of the parts. It is more economical weight- and cost-wise to double the size of skin sheets and plate than to obtain the increased sur-

face area by splicing two or more sheets together. It appears more advantageous to use a one-piece 30-ft wing beam produced by extruding or forging than by splicing two 15-ft sections together. It is more advantageous to increase the cross sectional area of a beam cap or bulkhead flange by increasing the dimensions than to obtain the additional area by laminating or "bits and pieces" buildup. Therefore, the dimensional growth as well as the greater loads can be most efficiently absorbed by the use of large forged and extruded elements. This combining of parts as opposed to "bits and pieces" construction has been labeled "integrally stiffened structure."

To meet the demands the performance trends indicate, larger wing, fuselage and other components are needed. These new requirements in overall size, higher loads and reduced overall manufacturing cost can best be obtained through integrally-stiffened structure.
(Continued on next page)



These graphical representations chart the trends of speed, weight, range and altitude improvement for fighter, bomber and transport aircraft over the past 16 years. The points on the graph at which the most notable new developments affecting performance were introduced have been marked and the development listed.

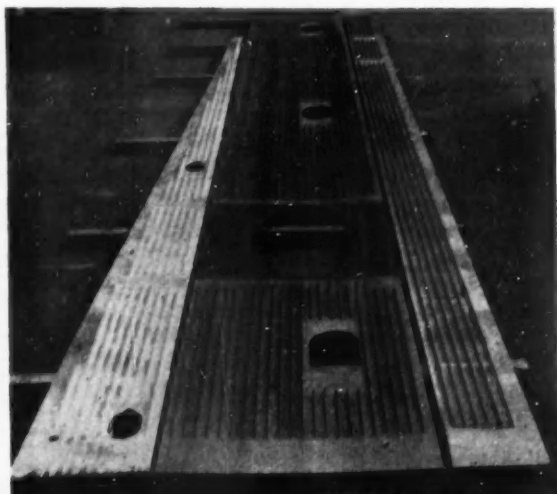


Fig. 1—Of the three supplementary machined integrally stiffened wing skin panels shown, the center one is 32-ft long and is quite the largest panel of this type so far machined. Examination of the photo discloses the cross sectional variations possible with the machining approach. These variations compensate for net area effects and local attachment contingencies.

The Super Constellation inner lower surface is an excellent example of integrally-stiffened structure. Table I is a breakdown of the differences between the conventional "bits and pieces" approach and the in-

tegrally-stiffened structure now used, Fig. 1, left.

Extruded integrally-stiffened skin has one marked superiority over the machined type in that it permits the incorporation of the more efficient "T" or "L" stiffened section which, when considered independently, permits about an 18 per cent increase in allowable column loading because of the more efficient cross sectional material distribution. Nevertheless, this does not represent the whole story since currently available extruded sections cannot taper or vary in cross section, as machined sections can, to correspond to local loading conditions and to compensate for net area reductions due to splices or attachment holes.

Therefore, it is not possible to generalize that one is superior to the other. You can only apply their qualifications to the problems of specific designs to determine which should be used.

However, when we consider these integral types in comparison with the standard assembled stiffened skin construction, we find them in clear structural superiority, Fig. 2.

For one thing, there are definite practical limits to the closeness of the spacing of the attached stiffeners. Because of this, only about 80 per cent of the skin area can be really effective in skin gages in customary use, whereas with the integral type, we can achieve a 100 per cent skin working area.

An additional important consideration is the unavoidable overlap in stiffener attachment areas and the inherent reduction in net area due to stiffener and

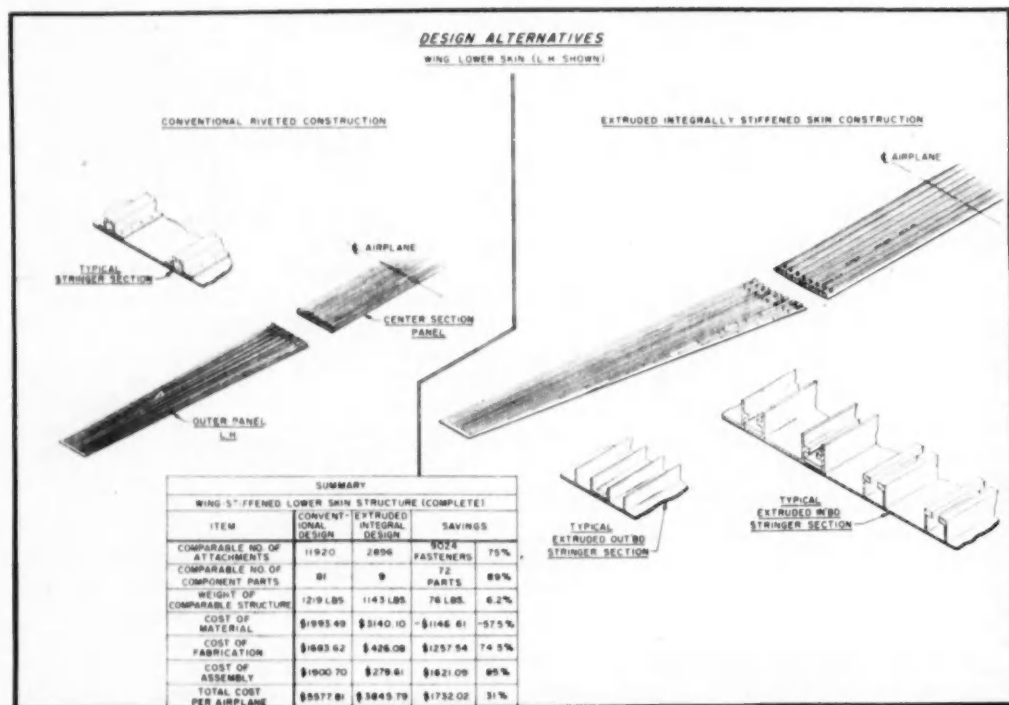


Fig. 2—A comparative examination of the relative merits of conventional stiffened skin construction versus extruded integrally stiffened skin construction is made with the resulting data listed on the illustration face. The wing joint shown is assumed to be of equivalent efficiency in both design alternatives.

other attachment holes which is an accepted corollary to assembled construction; but eliminated wherever integral structure can be applied.

A section property comparison of a forged integral wing beam with a standard built-up beam of extruded cap strips and a shear resistant web of plate stock shows that the attachment holes of the web assembly to cap strip and to upright stiffener can reduce the structural efficiency of the web.

In any comparison of integral wing beam construction with the conventional extruded cap strip type, we must keep in mind the fact that these extruded machined tapered cap strips are in themselves limited examples of integral construction that comprise up to 90 per cent of the beam cross section area.

Consequently, because of the high efficiency of this type of semi-integral construction, we do not get as sharp a definition of the advantages of the proposed 100 per cent integral construction here as we are able to achieve elsewhere. This is particularly true in the 12 per cent of chord thickness wing and holds until we progress to the thinner wings approaching say three per cent of chord in thickness. Here, genuine integral construction shows overwhelming advantage.

Figure 3, a shear flow diagram of the web of a beam of conventional construction as opposed to integral construction, gives pictorial proof of the extra

TABLE I

Comparison per Airplane—Inner Wing Lower Surface— 1049 Constellation

	Conventional Design 120,000 lb Gross Wt.	Integrally Stiff. Design 130,000 lb Gross Wt.	Savings	Savings Over Conventional
Total number of detail parts	1,806	334	1,472	+81.5%
Total attachments: rivets, screws, bolts, nuts, etc.	41,000	7,224	33,776	+82.4%
Weight of sealant (lower portion of wing only)	80 lb	30 lb	50 lb	+62.5%
Total weight of structure including all parts and sealant	1736.9 lb	1442.4 lb	294.5 lb	+17.0%

weight required by inefficient distribution of material in "bits and pieces" construction. The shaded area represents the difference in weight between efficient and inefficient distribution of material. Integral construction avoids all this by providing material of exactly the right cross section when we need it and where we need it—devoid of overlap eccentricities—and precisely corresponding to local attachment contingencies and stress requirements. This line of reasoning also applies to ribs, bulkheads, floor supports and other internal structural members.

The smoothness of a finished aerodynamic surface

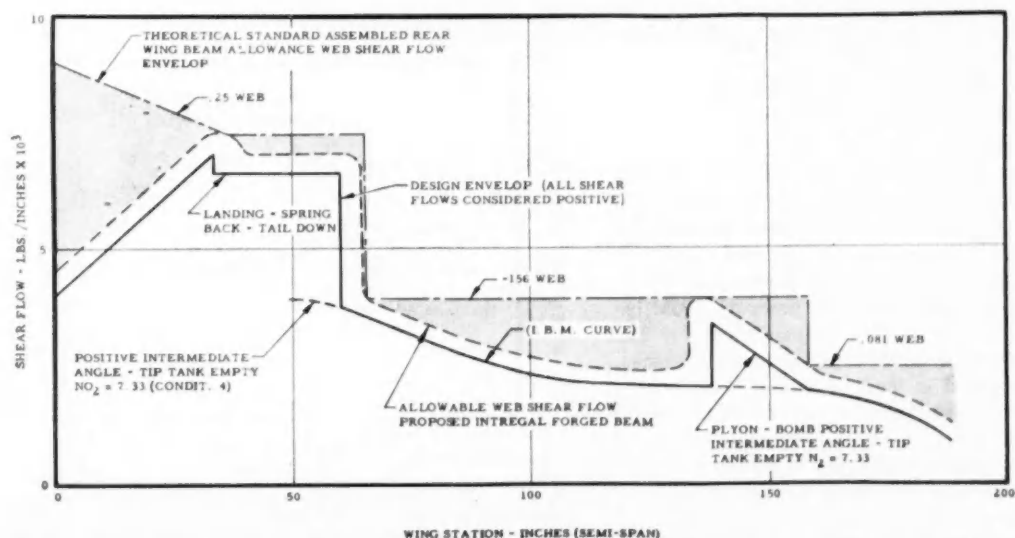


Fig. 3—Evaluation of web shear flows for wing rear beam comparing standard assembled beam construction with integral construction. Maximum (ultimate) average mid station rear beam shear flows (12 per cent wing).

is proportional to the stiffness of the skin between stiffening elements, type of substructure, number and type of attachments through the skin, and the number of surface joints. Integrally-stiffened structure, by combining the skin with the substructure (doublers, stiffeners, formers), making possible closer stiffener spacing also reduces the number of attachments and number of surface joints, all of which lowers the sources of surface irregularities and increases the probability of satisfactory aerodynamically smooth surface. Trailing edges and other secondary structure comprising an aerodynamic surface are usually excellent places to realize the advantages of integral stiffening.

Sealing of integral fuel tanks and pressurized areas is simplified. Sealing is only required in proportion to the number of joints, number and type of attachments through the pressure wall, whether this be skin, bulkhead, rib or spar webs. Integral structure reduces the number of joints, the number of attachments, the number of faying surfaces, which in turn reduces the amount of sealing material and manhours required to seal the structure either for fuel retention or pressurization.

The general application of large integral elements offers many important possibilities for cost reduction. However, of even greater importance, increased performance and weight reduction appear feasible without increased cost. Many instances of direct man-hour and tooling cost savings have been developed. The most apparent and readily acceptable savings are in indirect labor.

In many instances, savings in fabrication hours and tooling are apparent through a reduction in the number of different parts to be manufactured. Large elements eliminate much of the "bits and pieces" of manufacture and result in direct gains wherever the number of different pieces to be handled affects cost.

13,200 Ton Extrusion Press

By T. F. McCormick, Metallurgist
Aluminum Co. of America

WITH present extrusion presses the bore of the largest cylinder liners will handle ingots approximately 18 in. diam and 44 in. long. In the aluminum alloys such an ingot should produce a finished extrusion of about 800 lb. However with the 5500-ton press in use today, only 40,000 psi pressure could be applied against the ingot. This is insufficient for the strong alloys unless the ingot length is greatly reduced or the shape produced is large and simple in design. For aircraft extrusions, cylinder liners fitting ingots 11 in. and 14 in. diam are used most extensively in the present large presses, although 16-in. diam ingots can be and are extruded into certain types of sections from the strongest alloys. Thus, the usual limit of extruded shapes with present presses is about 600 lb.

The first of the very large extrusion presses under

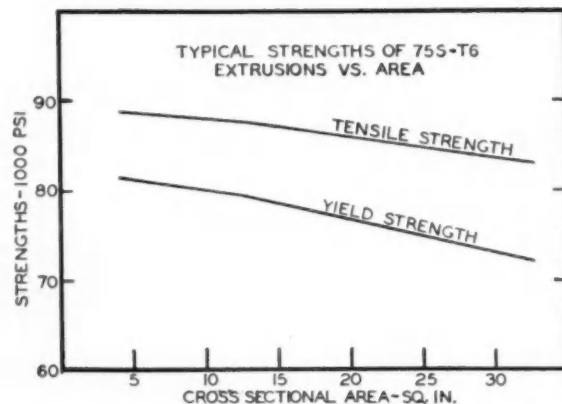
TABLE I

Minimum Thickness Extruded with 13,200 Ton Press

Circumscribing Circle Diameter Inches	*Minimum Thickness of Solid Shapes in Inches			
	3S-63S	61S-62S	14S	24S-75S
Under 13	0.093	0.109	0.125	0.156
13 to (not incl.) 16	0.109	0.125	0.156	0.187
16 to (not incl.) 19	0.125	0.140	0.171	0.250
19 to (not incl.) 23	0.140	0.156	0.187	0.375

* Greater thickness may be necessary for some shapes whereas lesser thickness may be possible for others.

the U. S. Air Force program, which will begin operation about the middle of 1953 at Alcoa's Lafayette Works, has a rated capacity of 13,200 tons—two and a half times greater than equipment now in operation. Cylinder liners will vary from 15¼ in. to 29¼ in. ID and be of sufficient length to handle ingots 70 in. long. Contemplated manufacturing limits for solid shapes produced with this press and its planned auxiliary equipment have been established with a maximum length of heat treated aluminum alloy extrusion of 90 ft, a maximum weight of 2300 lb and a maximum cross section to fit within a circumscribing circle having a diameter of 23 in. Such units cannot be stated on an absolute basis and under certain conditions they may be exceeded. Tubes and certain hollow shapes of larger diameter are a distinct probability. The minimum thickness for the average shape which can be extruded in several aluminum alloys is shown in Table 1.



As the cross-sections of extrusions in high strength alloys increase in area the strength of the product decreases slightly. Aircraft specifications covering the mechanical properties of strong aluminum alloys recognize this fact and require higher tensile and yield strength for the larger sections.

It is expected that solid ingots which fit a cylinder liner 25¼ in. ID will be the largest to be found in general usage in a 13,200-ton press. A larger cylinder will be available for extruding hollow shapes and tubes. The 25¼ in. cylinder permits the application of slightly over 50,000 psi pressure to the ingot. Sound, high quality ingots in 75S alloy have been cast and are available for extrusion in the sizes needed.

At the time of this writing no illustrations of the assembled press are available but some idea of its size can be gained from the fact that the foundation for the press is 172 ft long by 53 ft wide by 13 to 17 ft deep. This does not include the run-out table which will add considerably to the total length.

Large Castings for Huge Forgings and Extrusions

By **T. L. Fritzlen**, Chief Metallurgist
Reynolds Metals Co.

IT is estimated that a 32-in. diam strong alloy solid ingot weighing up to 8000 lb will suffice for extruding shapes and forging stock in a 25,000-ton extrusion press. This 32-in. diam ingot would permit the extrusion of 12-in. diam, and possibly larger diameter, rod for subsequent forging. Due to the nature of the extrusion process, extruded forging stock does not possess as uniform a structure as rolled forging stock.

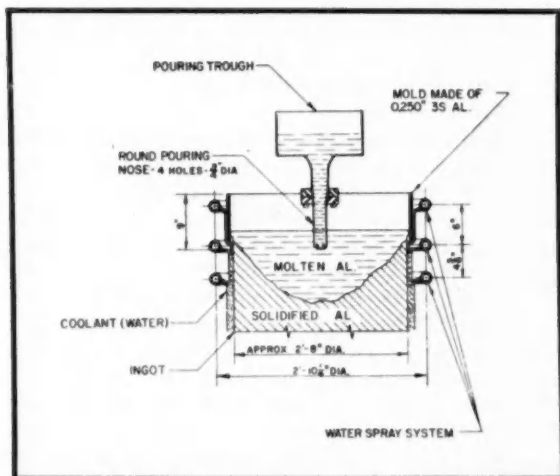


Fig. 1—Sketch of direct-chill casting equipment for production of 32 in. diam 14S aluminum alloy ingot.

Abnormalities in the structure and grain size of certain type forgings will result from the use of extruded stock unless the stock is upset prior to forging. Therefore, additional press time and cost are required to use extruded stock, instead of rolled stock, for some forgings. Fig. 1 shows a sketch of the casting equipment for a 32-in. diam ingot.

Development work on the extrusion of integrally stiffened sheet indicates that 32-in. OD by 16 to 20 in. ID hollow ingots should suffice for extrusion of this product in a 25,000-ton press.

The 50,000-ton forging presses will probably require up to 16 in. diam rolled stock, or the equivalent cross-sectional area of suitable extruded or forged stock, when the aircraft designer realizes that large forgings requiring such stock can be made. A 28 in. sq strong aluminum alloy ingot weighing up to 8000 lb should be sufficient to roll 16-in. diam forging stock. However, blooming mills larger than those now used for rolling aluminum would be required in order to take heavy drafts (large reductions) per pass to obtain 16-in. diam forging stock of satisfactory quality. These larger blooming mills would make possible increased production and decreased costs of forging stock and forgings during an emergency.

Rectangular ingots, 28 in. thick by 45 in. wide, would provide cast stock up to 12,000 lb for pressing or rolling prior to forging in the large presses.

20,000 Ton Extrusion Press

M. D. Stone
Manager of Development
United Engineering and Foundry Co.

As an example of the latest in extrusion press design, let us consider the 20,000 ton press being built as a part of the USAF program. Because of its great capacity, full tonnage is provided by five 4000 ton cylinders, four acting directly on the main cross-head, and the fifth acting as a separate piercer or as an additional main cylinder, at the choice of the operator. By proper valve selection, 1/5, 2/5, 3/5, 4/5, or full capacity may be chosen for a given operation.

The four main cylinders are located symmetrically on the horizontal and vertical center lines of the press—with the piercer cylinder located on the longitudinal center line, and to the rear of the four main cylinders. As can be further seen, the press is of the four-column type, each main column being 31½ in. OD, of alloy steel, and some 70 ft long, weighing upwards of 200,000 lb each. The column spacing vertically is 100 in. clear, and horizontally, 132 in. clear. Columns are fastened to the cylinder housing at the one end of the press, and to the platen at the other end—being held by shrinking between pairs of specially designed nuts, at initial loadings in excess of maximum operating loads.

Cylinder housing structure, because of casting, machining and transportation limitations, consists of four unit entablatures, each carrying a 4000 ton cylinder, and straddling a pair of contiguous columns, the top and bottom units each carrying one of the two 1200-ton pull back cylinders. Through the center of the multiple entablature structure is a cylindrical passageway that permits the free through-motion of

(Turn to page 146, please)

WASHINGTON OUTLOOK

OVER the three-year period 1951-53, American industry will have spent roughly \$80 billion for expansion—new plants, new equipment, replacement of old and obsolete facilities with new and up-to-date equipment. But the question in many minds is this: What are the prospects for keeping these facilities producing at high levels over the immediate years ahead?

Apparently the automotive and virtually all durable goods industries may look for high business levels to continue during 1953, probably through 1954. However, 1955 could—but need not—be something else. This is because expenditures for defense and industrial expansion will be taking a downturn, leaving a slack to be taken up by increased consumer spending.

This is the gist of the Commerce Department's report on its six-month study looking to "Markets After Defense Expansion" made by economists in and out of Government. The report recognizes the "real possibility" of a business downturn beginning with 1955

high level procurement for both vehicles and planes over the foreseeable future.

Getting down to a dollars-and-cents basis, including a carry-over of \$3.5 billion from June 30, 1950, Congress has appropriated \$42.5 billion for aircraft procurement during the three years ending June 30, 1953. Less than \$8 billion had actually been spent by last July 1, leaving more than \$34 billion available for commitment.

It is not possible at this stage to forecast the spending pattern for aircraft. This depends to a great extent on the international situation and to related major changes in the defense program—meaning that there could be either a speeding up or a further stretchout in procurement as the situation demands.

But turning to the automotive outlook as defense demands are met, the Commerce report says the survey indicated that heavy postwar sales averaging 4,500,000 vehicles a year has brought the number of passenger cars in use very close to the point where the backlog has been worked off insofar as actual need is concerned. But the report goes on to say:

"If over the next few years general economic conditions were to remain favorable, average domestic demand for new cars should be in the neighborhood of 5 million a year. The actual market may well be extended beyond this figure through extensive merchandising efforts."

Actually, the survey found that with the automobile now generally accepted as a necessity for more than 60 per cent of car owners, and recognized by the Government as a factor in the cost of living, new car sales represent from three to four per cent of consumer expenditures. Another four to five per cent goes for accessories, parts, operation and maintenance.

The outlook for a 5 million-car or better market is supported by the fact that while the age distribution percentage is back more nearly to what is generally considered normal, the number of over-age cars on the highways is still considerably greater than prewar. In addition, the number of passenger cars in use has increased 50 per cent since 1941 to a total of 44 million at the end of 1952.

There is no getting around the fact that the new car market is subject to wide fluctuations—as evidenced in the drop to less than 2 million vehicles during the depression years and the rise to about 6 million units in 1950. This is recognized by the survey. The report emphasizes that even though indications point to a normal demand of around 5 million cars,

(Turn to page 114, please)

By A. K. Rannells

**Washington Bureau
AUTOMOTIVE INDUSTRIES**

but points out that what happens will depend to a large extent on "business aggressiveness . . . to expand private markets."

What Congress does this year in the way of defense appropriations will have very little to do with the outlook for the next two years. The reason is that a substantial portion of the money already appropriated is still unspent.

Roughly, Congress has appropriated about \$208 billion since Korea for military and defense purposes. Some \$110 billion was still available as of January 1 which, at the current spending rate of \$55 billion, would be spread over two years.

This means that the bulk of military procurement is still ahead, particularly for aircraft. Air expenditures have accounted for about 50 per cent of military procurement so far and will account for a substantial portion in the future.

Present plans call for a military force (3,700,000) built around 21 Army and three Marine divisions and 143 air wings and 16 carrier groups. Many divisions will be highly mobile and mechanized. This calls for

for the Years Ahead

EXPENDITURES ON NEW PLANT AND EQUIPMENT

BY U. S. BUSINESS, 1945-53¹

[Millions of dollars]

	1945	1946	1947	1948	1949	1950	1951	1952 ²	1953 ²
Manufacturing	3,983	6,790	8,703	9,134	7,149	7,491	11,130	12,452	11,907
Durable goods industries	1,590	3,112	3,407	3,483	2,594	3,135	5,168	5,869	5,326
Primary iron and steel	198	500	638	772	506	509	1,304	1,681	1,391
Primary nonferrous metals	54	93	178	193	151	134	277	502	376
Fabricated metal products	216	356	370	343	271	350	421	350	360
Electrical machinery and equipment	123	282	304	289	216	245	359	389	454
Machinery except electrical	316	511	519	527	383	411	675	763	820
MOTOR VEHICLES AND EQUIPMENT	262	591	504	474	349	510	736	810	686
TRANSPORTATION EQUIPMENT EXCLUDING MOTOR VEHICLES	56	109	95	106	87	82	182	214	160
Stone, clay and glass products	100	241	326	269	181	280	388	293	280
Other durable goods ³	265	429	473	510	360	524	826	866	798
Nondurable goods industries	2,393	3,678	5,296	5,651	4,555	4,356	5,962	6,563	6,582
Food and kindred products	337	513	669	721	626	523	657	634	589
Beverages	97	157	277	332	249	237	311	381	416
Textile mill products	209	342	510	618	471	450	695	512	380
Paper and allied products	116	232	371	383	298	327	489	433	424
Chemicals and allied products	376	800	1,060	941	670	771	1,283	1,507	1,450
Petroleum and coal products	879	1,087	1,736	2,100	1,789	1,587	1,014	2,494	2,651
Rubber products	118	139	143	102	81	102	187	245	271
Other nondurable goods ⁴	261	408	530	454	371	359	327	378	401
Mining	383	427	691	882	792	707	911	850	871
Railroad	548	583	889	1,319	1,352	1,111	1,474	1,398	1,120
Transportation, other than rail	574	923	1,298	1,285	887	1,212	1,492	1,394	1,384
Public utilities	505	792	1,539	2,543	3,125	3,309	3,855	3,961	4,017
Commercial and other⁵	2,699	5,333	7,492	6,896	5,980	6,775	7,470	6,804	6,972
Total	8,692	14,848	20,612	22,059	19,285	20,605	26,332	26,860	26,271

¹ Data exclude expenditures of agricultural business and outlays charged to current account.

² 1953 estimates and those for the fourth quarter of 1952 are based on anticipated capital expenditures as reported by business in October 1952.

³ Includes lumber products, furniture and fixtures, instruments, ordnance and miscellaneous manufactures.

⁴ Includes apparel and related products, tobacco, leather and leather products and printing and publishing.

⁵ Based on reports from a group of large railroads accounting for more than two-fifths of the industry's outlay.

⁶ Includes trade, service, finance, communication and construction.

Source: Market After Defense Expansion Report, U. S. Department of Commerce.

Quick Testing for Tool Life

with

Radioactive Cutting Tools

TABLE I

Composition and Resulting Radioisotopes for Tool Tip Materials		
Tool Material	Nominal Chemical Composition	Resulting Effective Tracer Radioisotopes
Sintered Carbide (78)	WC 76%, Co 8%, TaC 4%, TiC 12%	W 185, Ta 182, Co 60
Sintered Carbide (78B)	WC 82%, Co 10%, TiC 8%	W 185, Co 60
H. S. S. (18-4-2)	C 0.8%, Mn 0.30%, Si 0.25%, Cr 4%, V 2%, W 18%, Mo 0.75%, Co 9%, Fe 64.9%	Cr 51, W 185, Co 60

THE search for increased tool life, through the development of improved cutting fluids, work materials and machining conditions, requires controlled laboratory tool life testing. The conventional laboratory method of tool life testing usually consists of machining with a cutting tool, either until complete failure occurs or to a predetermined amount of flank wear, as measured with a microscope. Attempts to accelerate these tests usually yield results which do not agree with practice. In these tests the time required to obtain tool failure or the predetermined amount of flank wear determines the time required to run the test. It is quite apparent therefore that a method for rapidly evaluating tool life, using a smaller amount of material and at less cost, is quite desirable. It is also apparent that any such test method cannot be based on tool failure. It can, however, be based on the rate of tool wear if this can be determined by measurements made over a sufficiently short period of time.

The rate of wear of a cutting tool, when machining under normal conditions, is so low that, to measure it by ordinary means, as by use of a microscope, requires observation over a long period of time, of the same order of magnitude as the life of the tool. This is illustrated by Fig. 1 where the observed wear on the flank of a cutting tool, as measured with a microscope, is plotted as a function of time. It can be seen that in

order to establish with precision the slope of the resulting average straight line, and thus to determine the rate of wear, observations have to be made over a period of time nearly as long as that required to reach a flank wear of 0.030 in., which corresponds to tool failure. Thus only a small saving in the time required for tool life testing can be obtained by measuring rate of wear if the ordinary means for making such measurements are used. Obviously, some extraordinarily sensitive means of measuring wear had to be found before a very rapid tool life testing method could be possible.

Following this line of thought, the idea was conceived of using a radioactive cutting tool to measure tool wear. It appeared that by this means it should be possible to determine the "instantaneous" rate of tool wear at any time throughout the life of the tool.

The "radioactive tool wear method" selected for exploration was conceived to consist, in essence, of machining with a cutting tool which had been rendered radioactive by neutron irradiation in a nuclear reactor and measuring the radioactivity of the collected particles worn from the tool during a few seconds of cutting. If it could be assumed that most of these wear products would adhere to the chips (as was later found actually to be the case), then this could presumably be done most conveniently by measuring the resulting radioactivity of the chips. The

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Hans Ernst, Director of Research, and E. J. Krabacher, Research Engineer,
The Cincinnati Milling Machine Co.

well known linear relationship obtained with conventional tool life testing methods, when plotting flank wear on the tool as a function of cutting time (Fig. 1), gave reasonable promise that a measure of the gross tool wear (total wear products abraded from the tool) would also result in a smooth curve when plotted as a function of cutting time.

Table I shows three of the tool materials selected for use in the investigation, together with their nominal chemical composition and the resulting effective tracer radioisotopes due to neutron irradiation in a nuclear reactor. Those radioisotopes which have sufficient half life and energy to render the tool useful for a considerable period of time are termed effective radioisotopes. Other radioisotopes are present after irradiation; however, they are either of such short half life that by the time the tips are received and ready for use the radioisotopes have decayed to the extent that their radioactivity may be neglected for purposes of this investigation (for example W 187) or their activity is so slight as to be of negligible value in the test (for example Fe 59 in high speed steel). The half life of a radioisotope is the time required for the radioactivity of a given amount of the element to decay to half its initial value. Table II lists the half life values for the effective radioisotopes.

The characteristics of the radiation emitted by these radioisotopes are also important to the success of the test method and are given in Table II. Here it may be seen that both beta (β) and gamma (γ) radiation are present. Beta radiation consists of high energy electrons. These beta

particles possess little penetrating power. Gamma radiation consists of high energy, short wave length X-rays. These rays have high penetrating power; they can penetrate several inches of lead. The fact that these two types of radiation are present is fortunate in that it allows either beta or gamma radiation to be measured in studying the tool wear products. This factor affords the opportunity of making a variety of basic studies which would not be possible if only one of the types of radiation was present. It may also be seen from Table II that the energies of all beta radiations of the various radioisotopes are very nearly equal, as are the energies of the gamma radiations (with the exception of the chromium 51 isotope found only in the high speed steel). This is a fortunate coincidence in that it offers a fairly homogeneous composite radiation with which to work. Thus the difference in decay rate (half life) of the various radioisotopes will have little effect on the characteristics of the overall radiation. (Continued on next page)

TABLE II

Characteristics of Effective Tracer Radioisotopes Resulting from Irradiation of Various Tool Materials					
Radioisotope	Half Life	Principal Radiation (Type & Energy)	Estimated Specific Activity of Tool Tip Material for 60 Days Irradiation (millicuries/gram)		
			Sintered Carbide (78)	Sintered Carbide (78B)	High Speed Steel (18-4-2)
Co 60	5.2 Yrs.	β^- .31 Mev γ 1.33, 1.17 Mev	5.2	6.5	5.8
W 185	73 Days	β^- .43 Mev no γ	8.8	9.5	2.2
Ta 182	117 Days	β^- .53 Mev γ 1.2, 1.1 Mev	10.0
Cr 51	26 Days	no β (K capture) γ .32, .26 Mev	2.6
Total Estimated Specific Activity of Tip Material			24.0 mc/gm	16.0 mc/gm	10.6 mc/gm

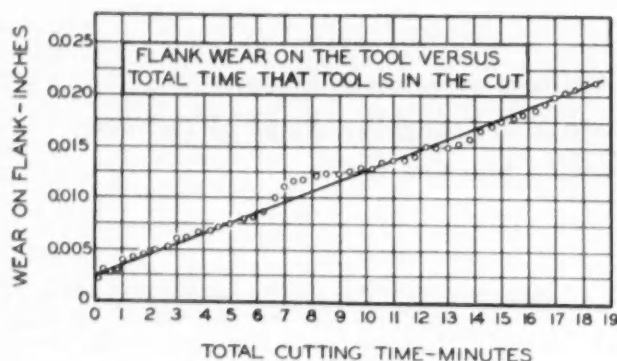


FIG. 1

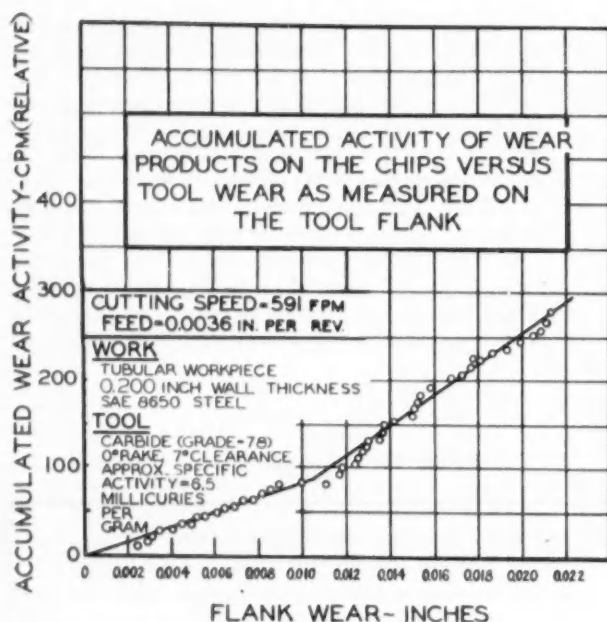


FIG. 2

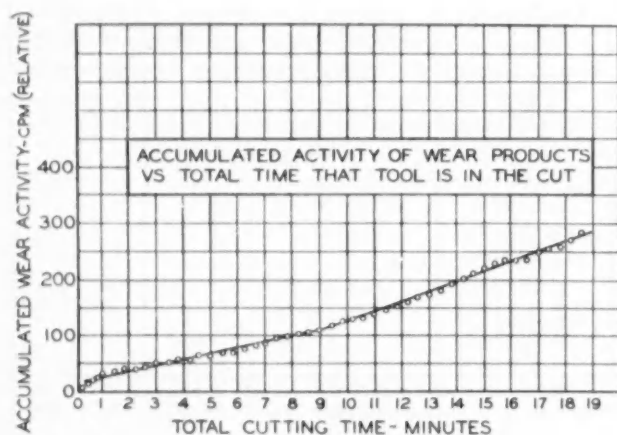


FIG. 3

It was established that the tool materials would, upon irradiation, furnish suitable radioisotopes for use in these tool wear studies, and the required specific activity of these materials was determined.

The cutting tools used for the tests are small tool bits approximately 5/16 in. square by 3/32 in. thick and weighing approximately two gm each. These are finish ground to shape, and marked for identification before they are irradiated. They are ground to a rhombohedral shape so that four cutting edges are available on each tip. Tool materials are sintered carbide, Stellite high speed steel and Tantung.

All cutting takes place within a completely enclosed cutting chamber mounted on the table of a knee and column type milling machine.

A tubular workpiece is used. It is held in a draw collet adapted to the spindle of the milling machine, and enters the cutting chamber from the rear, through a seal. The cutting tests are made by inserting tool holder with the cutting tool into the cutting chamber, clamping it securely and cutting on the end of the tubular workpiece. A wide range of feeds and speeds are available to give desired cutting conditions. After the cut has been made the tool holder and tool are withdrawn from the chamber and stored in a special storage block for convenient shielding, while the resulting chips which have been collected in a stainless steel wire mesh basket are removed through the cutting chamber door. The chips are then cleaned, dried and weighed preparatory to counting. A right-angled microscope setup provided with a micrometer eyepiece is used for inspecting the cutting edge of the tool and for measuring flank wear when desired. The microscope is mounted in a steel block to provide proper shielding from radiation.

Measurement of the activity of the chips for determining the "instantaneous" rate of tool wear is carried out in a part of the laboratory away from the "hot lab," where the background readings are normal. Both beta and gamma counting techniques have been investigated as a means for measuring the activity of the wear products present on the chips. Gamma counting was found to be quite satisfactory for the wear rate determinations. The beta counting technique has been used for special studies of individual chips.

For wear rate measurements the chips are placed in a Marinelli breaker for counting. This type of beaker contains a central (Turn to page 90, please)



Hudson Super Jet. Except for its special deluxe features, this model is similar to the Jet.

Hudson Jet

and

Super Jet

THE long awaited Hudson light car, priced within the so-called low price range, now has been officially announced by Hudson Motor Car Co. It is launched in two models—the Hudson Jet and deluxe Super Jet. Both are four-door sedans. The Jet model has a base list price of \$1685.00; the Super Jet has a list price of \$1775.00.

Except for the special deluxe features of the Super Jet, both models have the same basic specifications. Featuring the Hudson step-down design, with body and frame integral, both models have a wheelbase of

104.3 in., overall width of 67 1/16 in., overall length of 180 11/16 in., and the extremely low weight of 2800 lb. Power steering is available as an extra cost option.

The engine is new—of the same basic design as other Hudson L-head engines. It has six cylinders—3 in. bore by 4 3/4 in. stroke, 202 cu. in. displacement. The standard engine develops 104 bhp with a compression ratio of 7.5 to 1. As an option, the same basic engine is available with a compression ratio of 8 to 1 using an aluminum cylinder head. This setup, together with Hudson Twin-H-Power—two carburetors and special induction system—provides 114 bhp.

In addition to the Twin-H-Power option and power steering, both models also are available with Hydra-Matic drive, or B-W overdrive.

An improved semi-floating, hypoid gear rear axle has been designed for these cars with a standard gear ratio of 4.1 to 1 with manual shift transmission. For mountain operation, a special ratio of 4.27 to 1 is available. In addition, there is an economy ratio of 3.31 to 1. With overdrive, the gear ratio is 4.27 to 1 standard, 4.1 to 1 optional; with Hydra-Matic, 3.54 to 1 is standard, 3.31 to 1 optional.

Standard tire size on the Jet is 5.90—15; on the Super Jet, 6.40—15. The latter size is available on the Jet at extra cost.

Willys Sales Set New High in 1952

Willys-Overland Motors, Inc., ended its fiscal year last Sept. 30 with sales of more than \$301 million, the highest on record. Earnings last year, before taxes, totaled more than \$18.5 million and after provision of about \$12.5 million for estimated taxes the company showed a net

profit of slightly more than \$6 million. Federal income, surtax, and excess profits tax, and Canadian income taxes for the year were more than double the company's net earnings. Military jeeps comprised about 32

per cent of Willys' total vehicle production of 148,216 units during the 1952 fiscal year. The company has a civilian and military backlog of approximately \$225 million, and expects defense contracts for jeeps to run until the middle of its 1954 fiscal year.

INDUSTRY

PREVIEWS

and

REVIEWS

PETROLEUM at All-Time High

Production, processing and distribution of petroleum soared to new all-time peaks in 1952, according to the American Petroleum Institute! In a year-end report on the U. S. oil industry's 1952 accomplishments, Frank M. Porter, president of the API, said domestic demand approximated two billion 650 million barrels, and total demand (which includes exports) exceeded two billion 800 million barrels. These represent an increase of slightly more than three per cent over the former highs established only last year.

The 1952 increase was described as modest in comparison to the larger gains of recent years. The Institute said this could be an indication that the postwar surge in petroleum demand is now leveling off to an area of more normal growth.

More crude oil, natural gas liquids, natural gas, motor fuel and distillate fuel oil were produced than in any other 12-month period. Refinery capacity and the amount of crude oil processed in refineries reached all-time peaks; and to help meet current demands and prepare for tomorrow's, a record-breaking number of wells were drilled. The industry's capital expansion program for 1952 was estimated at more than four billion dollars—an increase of nearly 25 per cent over the 1951 total.

The API president estimated the production of liquid petroleum in 1952 at two billion 516 million barrels, an increase of 66 million barrels over 1951. This, he said, includes production of two billion 295 million barrels of crude oil and 221 million barrels of natural gas liquids.

Motor fuel production rose to one billion 187 million barrels, an increase of slightly more than four per cent over the preceding year's record of one billion 139 million barrels. This is equal to 49 billion 854 million gallons, or roughly 940 gallons for every one of the 53 million motor vehicles in this country.

Production of gas oil and distillates jumped 10 per cent to 524 million 250 thousand barrels. Residual fuel oil showed a slight decline, from 469 million barrels in 1951 to 452 million barrels in 1952. However, the combined total for all fuel oils was 976 million 400 thousand barrels—the highest point it ever has reached.

The number of wells drilled in 1952 is estimated at 46,800—up 2250 over 1951's former record. Emphasizing the financial hazards with which oil producers must contend is the fact that 17,950 of the wells were dry holes.

No report is yet available on the amount of new oil discovered in 1952, but proved reserves undoubtedly were increased again as a result of the record-breaking level of drilling operations. At the beginning of 1952, proved reserves of liquid petroleum were estimated at 32 billion 192 million barrels, an all-time high.

RUBBER Highest Output in '53

Winding up 1952 almost completely free of use controls, the rubber manufacturing industry in the U. S. scored its second largest rubber consumption record in history.

Consumption was higher in only one other year—1950,

when Korea touched off waves of scare buying. The 1952 consumption is estimated at 1,250,000 long tons of new rubber, as compared with the 1950 peak of 1,258,557 long tons. The industry consumed 1,214,298 long tons in 1951.

Based on the accelerating tempo of rubber goods production in the last quarter, an all-time consumption record is forecast for 1953 by the Rubber Manufacturer's Association in predicting the use of 1,300,000 long tons of new rubber over the next 12 months.

During the past two years, rubber consumption by type was:

	1951	1952
Natural rubber	454,015	450,000
Synthetic rubber	760,283	800,000
Total new rubber ..	1,214,298	1,250,000
Reclaimed rubber	346,121	280,000

In April NPA lifted rubber consumption controls, except for a token restriction on the use of pale crepe rubber, for the first time since June, 1941. At the end of June the General Services Administration relinquished the role of exclusive buyer of natural rubber which it had held since Dec. 29, 1950, and returned buying to private industry. The Emergency Procurement Service of GSA remains in the rubber picture only as the custodian of the stockpile and as purchaser of rotation rubber and small additional strategic stocks.

The roadblock to disposal of Government-owned synthetic rubber industry has been up to this point the proper insistence by Congress that as a condition of sale the nation must first have an adequate security stockpile of natural rubber and a synthetic rubber industry capable of standing on its own in free competition with natural rubber.

Those conditions have now been satisfied. The industry, the Defense Department and the many other agencies of the Government concerned with the problem are agreed on that. The Government has accumulated a natural rubber stockpile sufficient to carry us through more than five years of all-out war without any imports during the war period. Moreover, there is in being a synthetic rubber industry capable of producing more than a million tons of high quality rubber per year. Under Congressional directive, the RFC is now preparing a preliminary report on a disposal program. The report must be submitted to Congress by Mar. 1 of this year. Forty-five days later, the new President is required to submit specific disposal legislation to Congress.

Tires paced the heavy consumption that followed generally through other divisions of the rubber manufacturing industry. Passenger car production is estimated at 73 million units for 1952, as compared with 66 million in 1951. Output was divided: 47 million units for replacement, 24 million for original equipment, 2 million units for increase in inventory and export shipments. The industry expects both truck and passenger car tire production in 1953 to exceed the 1952 level.

The industry's forecast is that mechanical rubber goods, including heavy industrial types of belting and hose, will share the high level of demand that is seen for tires in 1953.

Foam sponge rubber scored new gains in 1952—with one of the significant factors being development of synthetic lattices that captured 40 per cent of a growing market heretofore dominated by natural rubber latex.

Lighter mechanical rubber goods, such as molded and extruded products, showed production gains on growing demand from manufacturers of automobiles, trucks, refrigerators, radio and television sets, etc.

Sales of camelback for recapping continued at a high level in 1952 despite competition that came with the introduction last year of the second line tire. Recapping of farm tires and the "winterizing" and "snow-treading" of used tires continued to show substantial gains.

RFC states that on the basis of reports from industry there is a growing preference for cold rubber. Estimated for the last half of 1952, synthetic requirements ratio is now 55 per cent for cold rubber.

FARM TRACTORS Strikes Curtail Production

Farm tractor production in 1952 fell about 24 per cent short of 1951 figures, according to a year-end review of the farm machinery industry released by the National Production Authority, Department of Commerce. About 435,000 farm-type wheel tractors were produced in 1952 as compared to 571,000 in 1951.

Farm machinery makers are reported to be generally optimistic over the 1953 demand for their products, with best estimates placing production and sales at least equal to 1952. Also brightening the picture is the fact that defense contracts will represent a much larger share of 1953 production than in 1952.

The sharp fall-off in farm machinery production is largely attributable to the 90-day steel strike plus work stoppages within the industry itself. The steel strike caused the J. I. Case Co. to shut down about one-half of its plants for 60 days, with the balance down some 35 days. The Massey Harris Co. was down about 90 days in its U. S. plants. Other leading manufacturers, with the exception of International Harvester Co., were able to keep going on a reduced operations basis.

International Harvester suffered a severe set-back when most of its plants, which included tractor lines, went out on an 84-day strike. A strike in the Borg-Warner plants, producers of tractor transmissions for some of the major tractor makers, caused several slow-downs in farm machinery plants. Most serious was the complete 60-day shutdown in the plant of Harry Ferguson, Inc.

Although all these plants are now back in full operation, the steel situation in the industry still is cloudy, with some leading manufacturers reporting inability to place orders with the middle-western steel mills. However, there may have been a slight improvement during December. Bars, plates, and some types of sheets continue to be in tightest supply.

ALUMINUM Record Output in '52

The aluminum industry has set a new production record in 1952, in spite of curtailments due to power shortages. On the basis of definite figures for the first eleven months, the Aluminum Association estimates total production of primary aluminum in the U. S. during the year at 1,860,000,000 lb. This exceeds the 1,840,358,500 lb produced in 1943, peak year of World War II.

The worst drought in many years sharply curtailed the production of electric power at hydroelectric plants serving primary aluminum smelters in both the Pacific Northwest and the South during the last quarter. The new capacity which went into operation as part of the industry's current expansion program, however, kept the production to high enough levels during the last three months of the year so that it was almost equal to the third-quarter total.

The industry's expansion program was hampered somewhat by the steel strike during the early part of the year. Nevertheless, four new smelting plants went into operation during the year and additional equipment expanded the capacity of four existing plants.

A third round of aluminum expansion was announced by the National Production Authority which is scheduled to increase the industry's annual primary capacity by 400,000,000 lb. This new expansion already has brought a fifth producer into the picture and negotiations are under way with additional prospective producers. One of the present producers has announced plans for a new smelting plant in Alaska which initially will have an annual capacity of 400,000,000 lb.

To supply the additional alumina required for the new smelting capacity, two new bauxite refining plants are being built and two existing plants enlarged. One of the new plants began operations last year.

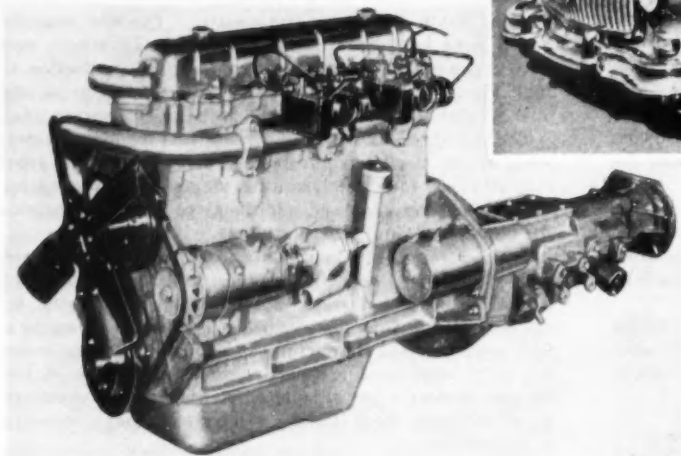
Bauxite mining is being stepped up as required to meet the new production demands. Two U. S. producers have been developing bauxite mines in Jamaica, and one of them has been making regular shipments of bauxite from that West Indies isle since June.

During the fourth quarter of the year the Defense Production Administration announced an expansion goal for aluminum sheet, and aluminum sheet and plate heat-treating facilities. The aim is to provide for additional rolling capacity for 684,000,000 lb of aluminum sheet annually by January 1955 and additional heat-treating capacity for 846,000,000 lb of sheet and plate annually by then also.

Although restrictions on the use of aluminum for civilian uses were in effect throughout the year, a number of developments indicated what may be expected when the restrictions are removed, such as extension of application of the metal as an electric conductor. Aluminum cable has proved itself on high-voltage transmission lines through years of satisfactory service.

An increasing use of aluminum in the automotive field was another significant development during 1952. More operators of trucks and busses are finding that the lightweight and rust-free characteristics of aluminum soon defray its additional cost through reduced operating and maintenance expenses. The greater use of aluminum cylinder heads and other engine castings in lightweight military engines presages an increasing use of the light-weight metal in these units for civilian use. Development of the so-called "sandwich construction" in which several fairly simple castings are brazed together to form complete engine components is one of the significant advances in this field. Aluminum automobile radiators may be found on cars of the future as a result of new alloys and fabricating methods developed during 1952.

LeMans six-cylinder, overhead valve, Dual Jetfire engine which is optional in the Ambassador.



Ambassador Country Club hardtop convertible.

WHILE the body lines of the 1953 Nash Ambassador and Statesman models remain unchanged, maintaining the Pinin Farina styling brought out last year, many mechanical improvements have been introduced.

At the top of the line is a new Country Club model in both Ambassador and Statesman which is delivered as a custom car. Other Ambassador and Statesman models include the two-door club sedan and the four-door sedan in both the Custom and Super series. Nash Airliner reclining seat and convertible twin beds are optional equipment on all Ambassador and Statesman models, as well as tinted Solex glass.

One of the principal mechanical advances is the new Nash Statesman Powerflyte engine with horsepower increased from 88 to 100, which is said to show even increased fuel economy at certain speed ranges. Added horsepower in the six-cylinder, L-head engine was gained through modifications designed to increase overall engine efficiency without increasing displacement. Compression ratio has been boosted from 7.0 to 1 to 7.45 to 1. A new double-barrel, duo-flo carburetor is used. Intake manifold passages have been

1953 NASH *Improvements*

enlarged in this year's offerings, and also combustion chambers have been redesigned. A new high-lift camshaft is used, and the exhaust system improved.

In the Ambassador, the six-cylinder overhead valve 120 hp Super Jetfire engine is retained, while an optional LeMans Dual Jetfire engine is offered. The LeMans six-cylinder overhead valve engine develops 140 hp at 4000 rpm. It has two side-draft carburetors which work in conjunction with an oversized intake manifold. Like the Super Jetfire engine, its seven bearing crankshaft is 100 per cent counterbalanced.

Nash power steering, developed jointly by Nash engineers and Bendix, is optional on the Ambassador. It provides direct hydraulic actuation of the steering linkage and eliminates 75 per cent of the effort in steering while allowing the driver to retain the feel of the road at all speeds and under all road conditions. This system gives positive directional control, even with the hydraulic power off.

Three transmission choices — Dual-Range Hydra-Matic, automatic overdrive and standard synchromesh are retained for 1953.

There are 26 solid and two-tone color combinations offered in the two lines during 1953, and eight solid and two-tone interior color trim options in both the Ambassador and Statesman lines.

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Industrial Peace Pays Off. Western Metal Show Expected To Be Largest of Kind on Pacific Coast.

LaPointe and Industrial Peace

For the latest case study published on the causes of industrial peace under collective bargaining, the National Planning Association chose the LaPointe Machine Tool Co., Hudson, Mass. The Association has analyzed, in Case Study 10, what it calls "a stable union-management relationship in the highly competitive machine-tool industry."

During eight years marked by periods of sharp contraction and rapid expansion in the industry, LaPointe and Local 3536 of the United Steelworkers of America (CIO) have progressed from an unsatisfactory start, followed by a long and costly strike, to a high quality industrial peace, NPA states.

Management Benefits

This "peace" has given management increased production and profit stability along with smoother operations. One of the things that has made this possible is the cooperative approach or information-sharing within the work force. Dissemination of information between engineers, schedulers, and production workers has paid dividends in the working out of difficult problems. Good pay, security and recognition in the solving of production problems and training new workers are the gains made by union members, according to the NPA report.

Market Outlook

A recent Department of Commerce survey on "Markets after the Defense Expansion" reports that U. S. business currently expects to invest approximately the same amount in plant and equipment in 1953—\$26.3 billion—as it invested in the record years 1951 and 1952. Indications are that this high level of expenditures for industrial equipment may be sustained through 1954 and 1955.

According to the Council for Technological Advancement, which has analyzed the survey in a bulletin of

its own, the expected continued high level makes evident that employment and higher living standards are dependent upon the capital goods industries and the users of capital goods.

New Steels for Automobiles

New alloy steel for automobile production, particularly stainless steel for trim, will be widely discussed at the Western Metal Exposition and Congress to be held in Los Angeles, Calif., March 23-27. Features of the show will be a comprehensive array of metals, and metal fabricating equipment, according to the American Society for Metals, sponsor of the affair. In addition, it is claimed, the largest machine tool exhibit yet held on the Pacific Coast will be seen in action.

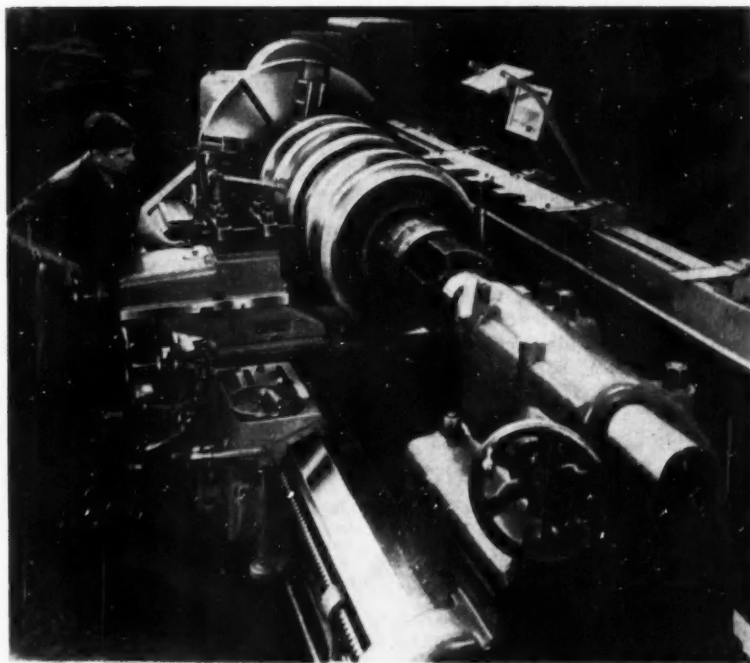
Gear Index

According to the American Gear Manufacturers Association, the gear

index for November, 1952, is computed to be 151.4 per cent of the 1947-49 base. This is a 6.2 per cent decrease in gearing industry volume as compared with October, 1952.

Lathe Demonstration Planned

A special demonstration of a new 40-in. LeBlond roll contouring lathe in operation will be held in the company's plant in Cincinnati, Ohio, during the week of January 26, according to B. N. Brockman, vice president. To attend the demonstration, get in touch with LeBlond, stating which day it would be convenient to come to the plant. The lathe features two-directional hydraulic tracing and a variable speed range from one to 165 rpm. It is claimed that the feed and speed can be varied during a cut without interrupting the finish of the work-piece.

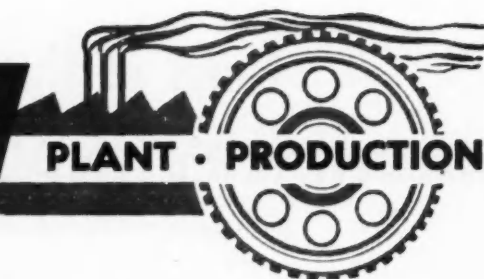


This LeBlond roll contouring lathe will be on demonstration during the week of January 26 at the LeBlond plant in Cincinnati.

NEW

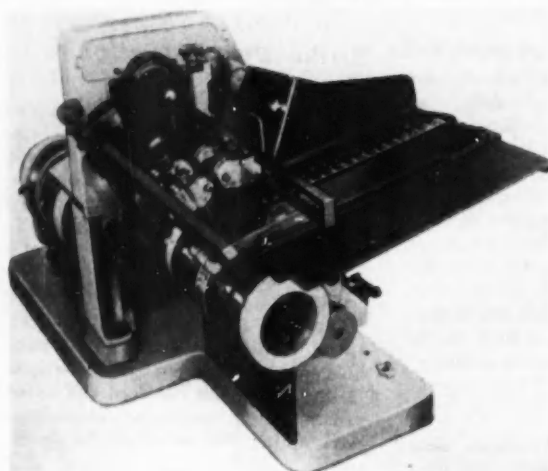
EQUIPMENT

PLANT • PRODUCTION



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Marking Machine for Cartridge Enclosed Fuses



Markem marking machine, Model 51A.

For printing label information directly on cartridge enclosed fuses, the Model 51A marking machine has been developed. It produces direct ink imprints which are said to be unaffected by moisture or ordinary chemical atmospheres.

Use of this machine and the markings it makes on fuses meets with approval of Underwriters' Laboratories, Inc. Fuse manufacturers subscribing to UL testing service use a special recording die roll which counts the number of impressions made—maintaining the required UL control.

This addition to a line of machines for special marking applications will be followed by machines for marking fuses of all types. *Markem Machine*

Circle E-1 on page 65 for more data

High-Speed Machine for Down-Cut Milling

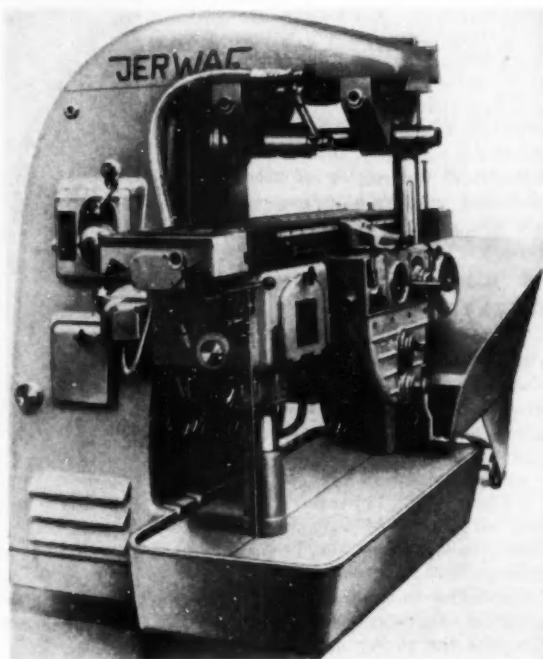
A milling machine, the Jerwag, has been designed for the climb or down-cut method of milling without special supports or accessories. In the Jerwag method of milling, the cutter edge begins to cut immediately upon making contact with the work.

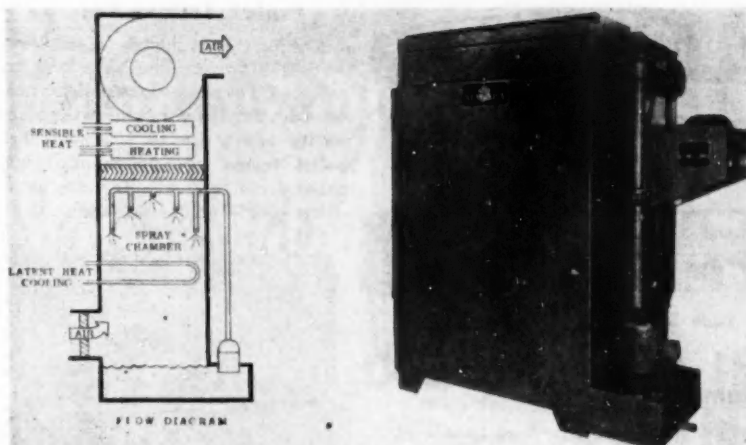
The machine is built for use with high milling feeds and speeds. Bed is designed to handle high torque and torsional stresses. Special thrust-absorption frames take up forces acting on the arbor, support bearings, overarm, table and bed and support pillars.

Working surface of table is 55 in. by 14 in. Range is 39.370 in. longitudinal, 13.780 in. vertical, 5.906 in. cross. Milling spindle is case-hardened, runs in ball and roller bearings. Front bearing takes up radial thrusts; preloaded ball bearing takes up axial thrusts. A drum controller provides six speeds for milling spindle in direct drive, six additional speeds through back gears. *Kurt Orban Co.*

Circle E-2 on page 65 for more data

Jerwag milling machine distributed by Kurt Orban Co.





Niagara air conditioning apparatus.

Air Conditioning Apparatus

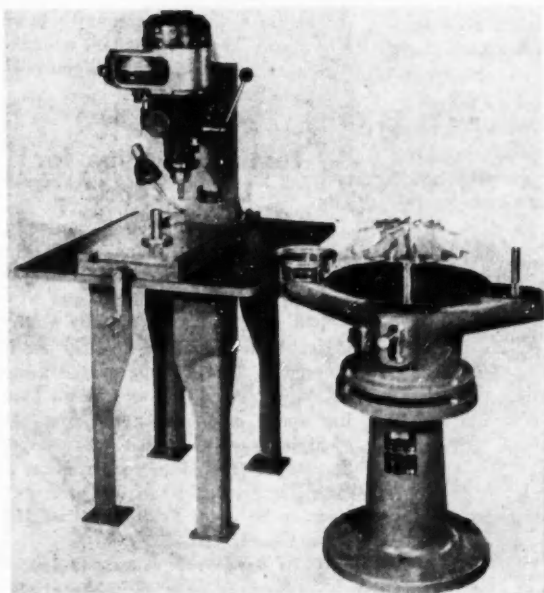
Development of improved apparatus for the drying or moistening of atmospheric air by a liquid contact method has been announced. Air is treated to fix relative humidity and temperature independently, as separate functions, to obtain closer control of results. Filtered fresh air enters a new type of spray chamber providing contact between air and the spray liquid. The spray either adds moisture or removes it by absorption or by condensation. Condition of the spray liquid (its temperature or absorbent concentration) determines the

moisture content of the air leaving the chamber. The final temperature is fixed as a separate function, either within the apparatus or external to it.

The spray liquid used for removing moisture may be either refrigerated water or Hygrol. Dew point of the air is fixed accurately and final conditions are held automatically constant or varied by either adding or removing moisture in response to changing the instrument setting. *Niagara Blower Co.*

Circle E-3 on page 65 for more data

Milling Attachment for Balancer



Now in production is a milling machine for use with HI-EFF balancing equipment. Designed to make corrective cuts to bring parts into balance, the arrangement consists of a milling attachment mounted on a ground work table with coolant trough. A fixture mounted on ways is provided for out-of-balance parts. A manual feed screw with a graduated collar for measurement of stock removal also is provided. (*Taylor Dynamometer & Machine Co.*)

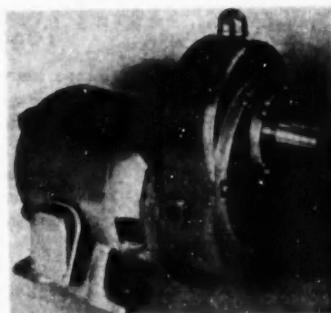
Circle E-4 on page 65 for more data

Single-Reduction Gearmotor

A Lifeline single-reduction gearmotor (Type B) is now available.

This gearmotor meets the mounting limitation requirements peculiar to side entry agitators and mixers, and is suitable for light duty coupled service applications such as fans and pumps. It is available in ratings from one to 30 hp, 780 to 420 rpm, AGMA Classes I and II. *Westinghouse Electric Corp.*

Circle E-5 on page 65 for more data



Westinghouse Lifeline gearmotor.

Short Turning Radius Fork Truck



Mercury short turning radius fork truck, Model A-3444.

Being offered is a short turning compact fork truck chassis of 3000 lb load rating at 24 in. load center. This unit is designated Model A-3444.

Of prime interest is the short turning radius which is said to permit right angle stacking in a 10 ft aisle with a 48 in. long load.

The chassis incorporates a double reduction unit drive assembly, a compensating controlled castor type steering axle, automotive wheel type steering control, foot control of travel acceleration and the Mercury hydraulic hoist system with balanced cross suspension of load. *Mercury Manufacturing Co.*

Circle E-4 on page 65 for more data
(Turn to page 58, please)

NEW**EQUIPMENT****PLANT • PRODUCTION**

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(Continued from page 57)

Toggle Clamps

Two lines of toggle clamps known as La-ko and Thayer clamps are currently available. A reported feature of both clamps is the Merriman replaceable, hardened steel bushings, installed at all pivot points. These bushings have a serrated surface that cuts its own bearing points.

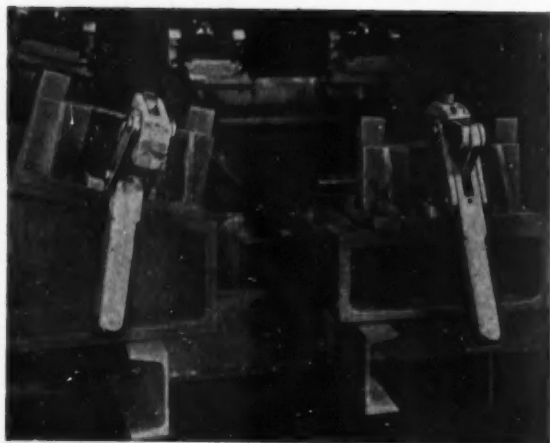
The handle is down in locked or unlocked positions to fit the available clamping space and to give clearance above fixture.

Thayer clamp, a heavy-duty clamp,

has a hold-down arm and handle of $\frac{3}{4}$ in. and one in. square solid stock. It provides a maximum holding pressure up to 2500 lbs.

La-Ko clamp was designed to fill the need for a light-weight clamp made from a stamping, yet rugged enough to withstand hard usage. It affords a holding pressure up to 650 lbs. The handle is also down in locked and unlocked positions. *E & E Engineering Co.*

Circle E-7 on page 65 for more data



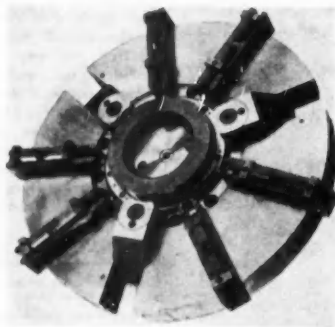
E & E toggle clamps.

Chucks for Turbine Wheels

Large turbine wheels and jet engine disks and rings can now be machined without distortion or strain when held in chucks recently engineered and designed, according to the maker.

These chucks meet the requirements of holding large workpieces of small cross-section without distortion strain or harmonic vibrations encountered when machined at high speeds. These chucks can be furnished on special order for either manual chucking or air power chucking for repetitive machining operation. *Cushman Chuck.*

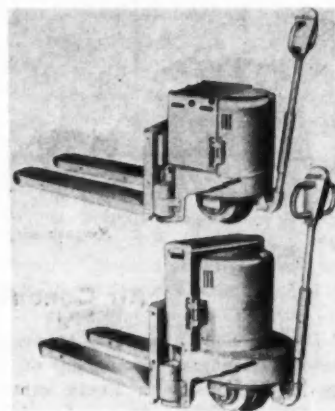
Circle E-8 on page 65 for more data



Cushman chuck for turbine wheels.

Pallet Trucks for '53

The first 1953 models in the Powrworker lift-truck line have been announced. The models are pallet trucks, electric battery-powered, with a capacity rating up to 6000 lb. These pallet trucks can be supplied with pallet forks to handle any size pallet, either single or double faced.



Clark '53 Powrworker models.

Walk it or ride it, optional models of the '53 Powrworker pallet truck are available. One is arranged for single tray (one by six) layout of battery, while the other accommodates a double tray (two by three) layout of battery.

Powrworker pallet trucks feature double hoisting cylinders for lifting the loaded pallet, motor-in-wheel drive, full time delay control with all contactors interlocked for progressive speed positions, positive safety-spring return handle which applies brake and cuts off power, and a bumper guard located higher to avoid operator injury. *Clark Equipment Co.*

Circle E-9 on page 65 for more data

Testing Machine for Large Loads

A floor-type, 200,000 lb, universal testing machine having a working capacity of four by 15 ft has been announced as available.

The crosshead is driven by a Thyrotrol motor mounted directly on the crosshead. Speed range of the motor is 20 to 1 providing an overall loading speed of 0.025 to 0.5 ipm and a high traverse speed of 15 ipm. Special flexure plate construction in each plane is said to allow eccentric loads to be used. *Young Testing Machine Co.*

Circle E-10 on page 65 for more data

(Turn to page 60, please)

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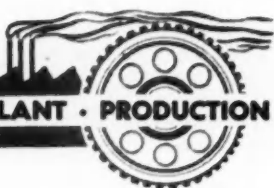
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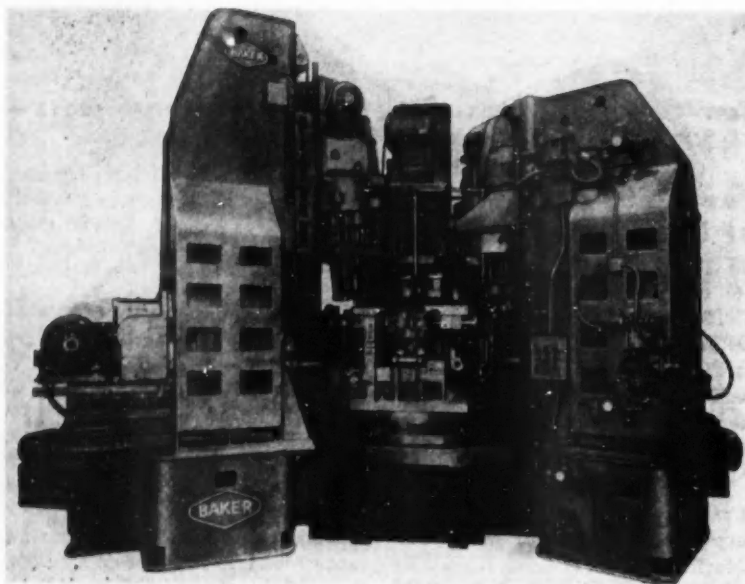
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(Continued from page 58)

Clutch Housing Machine Performs Multi-Operations

A multi-operation machine utilizing standard Baker 7½ x 16 and 15

x 16 units and a 72-in. six-station power indexing table, performs drill-



Baker multi-operation clutch housing machine.

ing, chamfering, boring, counterboring and tapping operations on clutch housings at a rate of 80 parts-per-hr at 100 per cent efficiency. Units are mounted in horizontal, vertical and angular planes. Operations performed at the six stations of the machine are as follows:

Station #1: Load & unload.

Station #2: Vertical unit—No. F drill two holes, 0.257 in.; one hole, 15/32 in.; five holes, 13/32 in.; two holes, 25/64 in.; three holes, "U" (0.368 in.); horizontal unit—F drill through eight holes, mill pad.

Station #3: Vertical unit—Combination 15/16 drill and 1/16 by 45 deg.; chamfer two holes; rough bore center bore one hole; rough bore starter bore one hole.

Station #4: Vertical unit—two holes, 0.438 to 0.499 in. diam ream; one hole, semi-finish center bore; one hole, combination semi-finish and finish starter bore; horizontal unit — eight holes, ¾ in. diam and 90 deg chamfer.

Station #5: Vertical unit—two holes, ¾ in. diam by 90 deg chamfer; three holes, ½ in. diam by 90 deg chamfer; two holes, spotface 1½ in. diam; horizontal angle unit—two holes, 15/32 drill; one hole. F (0.257 in.) drill.

Station #6: Vertical unit—three holes, 7/16—14 tap; two holes, 5/16—18 tap; horizontal unit—eight holes, 5/16—18 tap. Baker Brothers, Inc.

Circle E-11 on page 65 for more data

Drilling and Reaming Unit Machines Tank Parts

A special machine tool for drilling and reaming tank suspension support housings has been produced.

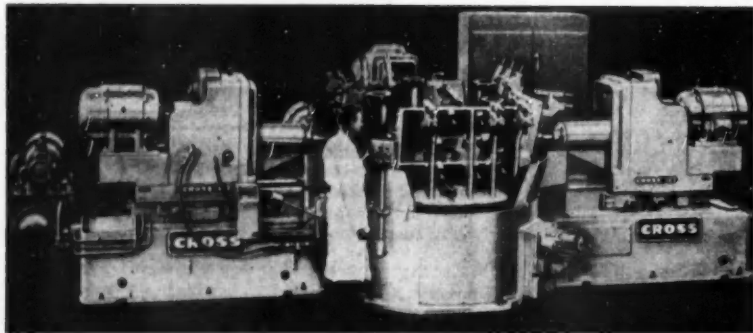
Housings are made of cast armor material with a Rockwell hardness of C-42. Four-in. diam holes are drilled

and reamed at the rate of 11 pieces per hour. The parts are held on a fluid, motor-driven index table with four stations. The first station is for loading and unloading, the second for drilling, the third for flat bottom drilling and the fourth for reaming. Preset tooling is utilized.

Hydraulic and electrical construction is to Joint Industry Conference standards.

Other features include hardened and ground ways, hydraulic feed and rapid traverse, and automatic gravity operated cam clamping for the index table. Cross Co.

Circle E-12 on page 65 for more data
(Turn to page 62, please)



Cross unit for drilling and reaming operations on tank parts.

Are space and weight savings vital?

*here's how leading aircraft manufacturers
get them with **NEEDLE BEARINGS***

Torrington Needle Bearings are integral design features in many leading aircraft because of their light weight and compactness coupled with their high rated radial capacity.

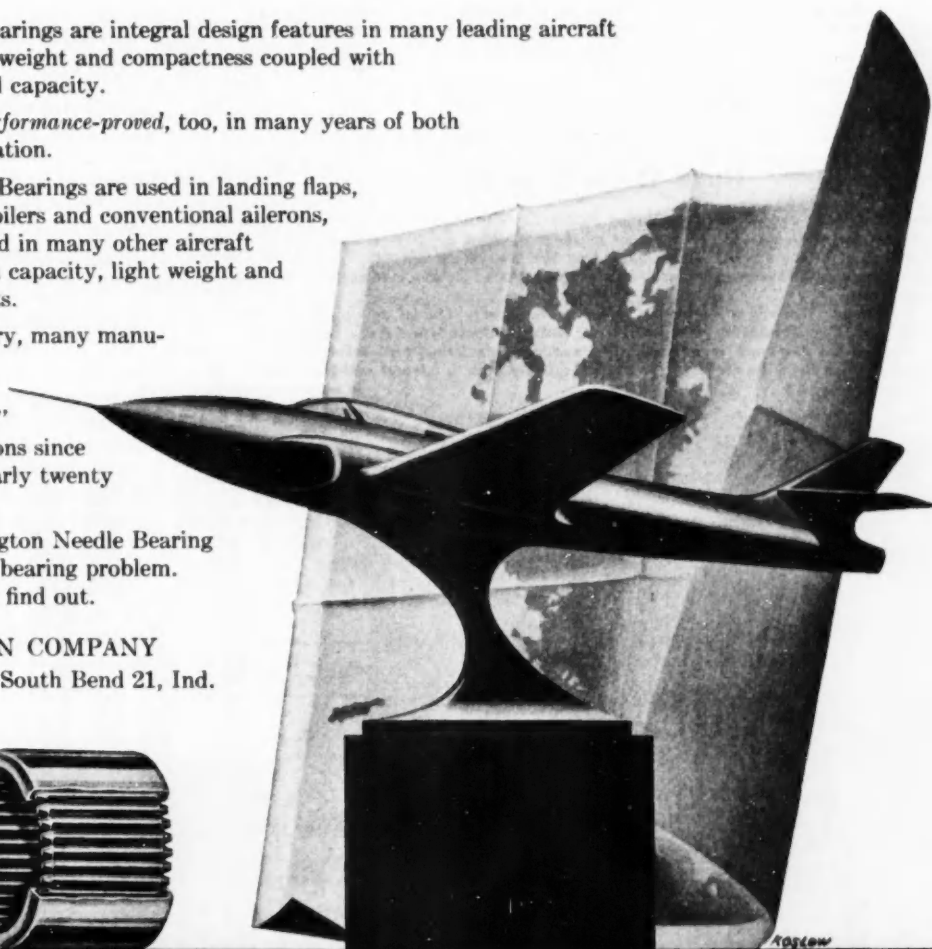
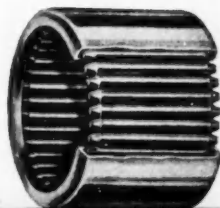
They have been *performance-proved*, too, in many years of both military and civil aviation.

Torrington Needle Bearings are used in landing flaps, leading edge slats, spoilers and conventional ailerons, elevators, rudders, and in many other aircraft assemblies where high capacity, light weight and compactness are musts.

Throughout industry, many manufacturers have made Needle Bearings "standard equipment" in countless applications since their introduction nearly twenty years ago.

Perhaps the Torrington Needle Bearing is the answer to *your* bearing problem. We'll gladly help you find out.

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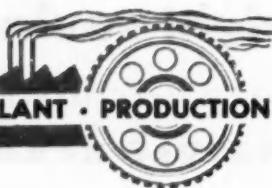
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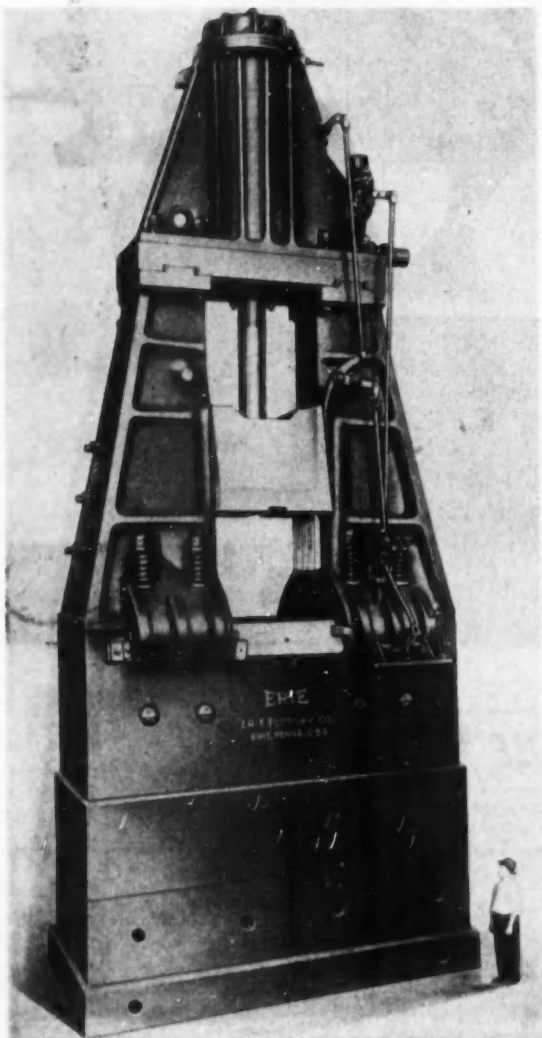
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(Continued from page 60)

Huge Steam Drop Hammer

The latest steam drop hammer, rated at 50,000 lb, is claimed to be the largest steam drop hammer now available. Shipping weight of the completed hammer, without dies, is in excess of 800 tons. When erected on its foundation, the hammer extends 16 ft below the floor and approximately 30 ft above the floor. It may be controlled by one man using a foot treadle or hand levers.

The hammer features a lubricating system of reportedly unusual design for lubricating the guide "Ys". The distribution valve is of a new counter-balance type. A key between each of the frames and the sow block keeps frames firm and prevents scale from working under the frame seats. Housing bolts are vertical. The bottom cylinder head is integral with the cylinder, and it is machined outside to serve as a huge dowel between the cylinder and the tie-plate. Pockets for the gland bolts are machined from the solid in the cylinder head. (Erie Foundry Co.)



Circle E-13 on page 65 for more data

Double Spindle Turbine Blade Grinder

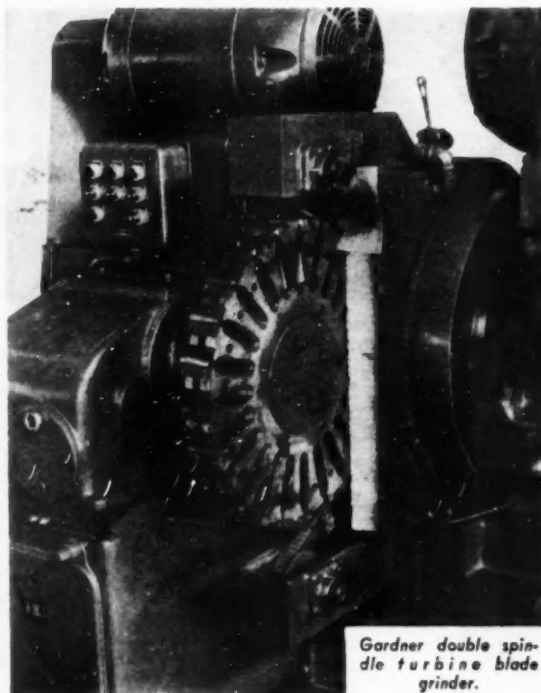
For the rough grinding of the parallel ends of turbine blades on a high production basis, a double spindle turbine blade grinder has been designed.

The machine consists of a heavy cast iron base supporting two grinding heads upon dovetailed slides operating on ball bearing ways. Centralized lubrication to these ways, is provided.

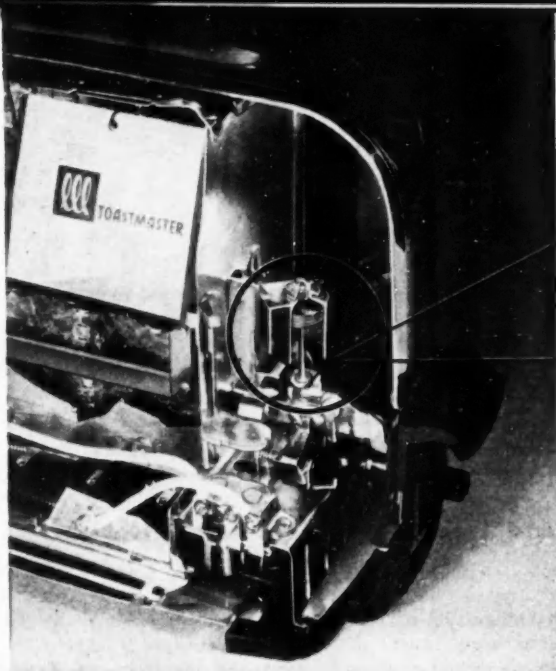
A rotary attachment carries a work-carrier having approximately 26 slots into which the turbine blades are manually loaded. A chain hold-down attachment holds the workpieces into the carrier during the grinding operation. They unload automatically after leaving the hold-down. A vari-speed drive on the rotary attachment permits varying the speed of the work-carrier within a 3 to 1 ratio.

Production is at the rate of 20 to 25 pieces per min., removing 1/16 in. maximum stock per end. Gardner Machine Co.

Circle E-14 on page 65 for more data



Gardner double spindle turbine blade grinder.



Restrictions on brass forced engineers in the Toastmaster Products Division of McGraw Electric Company to find substitute materials for a pneumatic damping device on the toast ejector mechanism. They had been using a cylinder, machined from solid $\frac{3}{4}$ inch brass rod, and a precision ground brass piston with a connecting rod on a swivel joint. The cylinder head was fitted with a spring and ball check valve. Tolerances on this complicated assembly had to be held within 2 mils to give satisfactory performance for at least 100,000 cycles at 350° F.

On pneumatic dampers **SILASTIC** *simplifies design* **... saves critical materials**

Many substitute materials and designs were tried with disappointing results before one of our technical representatives dropped in with samples of Silastic. Using this heat-stable, rubbery silicone product, Toastmaster's research and development engineers perfected a very simple and durable damper. It consists of an inexpensive drawn steel cylinder, a 1-piece connecting rod, and a flat ring-shaped Silastic piston mounted loosely between two metal cup washers with a simple air leak past the shoulder of the piston.

Tolerances on the new damper are large; the cylinder can be out of round; 86 pounds of mild steel displace 199 pounds of brass per 1000 toasters. And the new device works better than the more expensive brass assembly. Such performance proves the usefulness of Silastic as a new engineering material. It retains its rubbery properties and its good dielectric properties at temperatures ranging from below -70 to above 500° F. It is highly water repellent; shows excellent resistance to weathering and to a variety of hot oils and chemicals.

For more information on the properties or fabricators of Silastic mail this coupon today or phone our nearest branch office.

Dow Corning Corporation, Dept. C-1, Midland, Mich.

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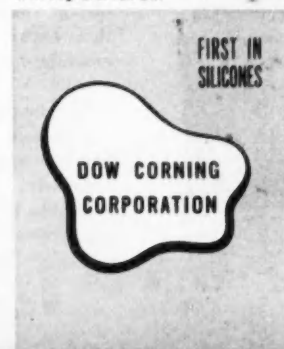
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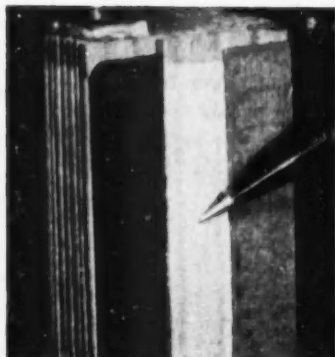
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NEW

PRODUCTS.

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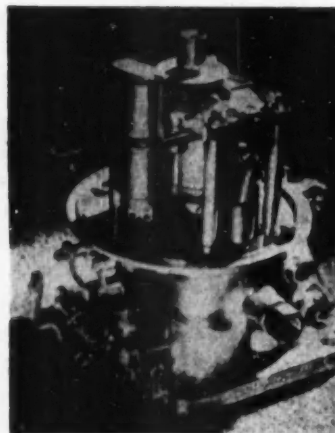
Wood Fiber Separators for Batteries

Just announced is a new type of battery separator that is said to retain all the advantages of natural wood while adding many others of its own. Known as Evanite, it is made of interwoven wood fibers and reportedly can be shipped dry, requires no caustic soda purification, and does not have to be inspected over lights for imperfections. It is claimed that the separator is strong, flexible, and will not chip, split, or tear easily. Ions are said

to flow easily between positive and negative plates through the separator because porosity is uniform. When electrolyte is added to the battery, the absorption of Evanite reportedly permits controlled expansion of separator.

Other advantages claimed for the separator are: high degree of mechanical strength; one-piece construction; and non-dependence on critical materials. *Evans Products Co.*

Circle P-5 on page 65 for more data



Four-Barrel Carburetor for Maximum Horsepower

Recently announced is the Centri-Quad, four-barrel carburetor, that is said to provide increased acceleration and higher top speed by allowing a faster, freer flow of air. Two idle adjustments reportedly eliminate "creep" in cars equipped with automatic transmissions.

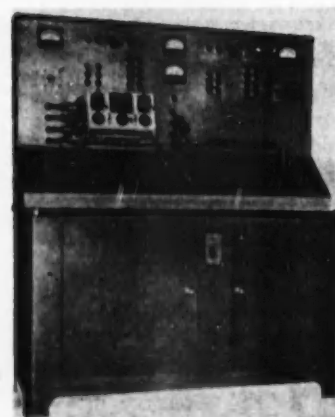
Designed on the concentric theory, all important metering units have been located at the center line of the fuel bowl. The latter is well insulated from engine heat to avoid percolation or "vapor-lock."

The Centri-Quad is reported to have mechanically operated second-

dary bores or barrels, in addition to the duplex primary throttle bores. The secondary bores are said to open for effective action at approximately 85 mph road load and remain open during all full throttle operations.

The combination of the pressure distributor and carburetor has been improved with a new mechanical spark control, according to the manufacturer. An initial increase in spark advance of 18 per cent is said to be provided by this system to supply an extra surge of power. *Holley Carburetor Co.*

Circle P-6 on page 65 for more data



Instrument Panel Tester for Tanks

Model TPT tank instrument panel tester is designed to enable quick checking of each electrical circuit and gage in instrument panels supplied by vendors. Proper functioning of the panel and speedometer are thus assured before delivery to the assembly line for installation in a vehicle.

The testing panel is a double unit that is said to be capable of checking two clusters and speedometers simultaneously. Two binding posts are available in the lower center of the main tester panel for attachment of

auxiliary leads to supply power for testing other electrical components of the vehicle.

Push-button type switches are used where the test requires only a momentary contact, and all test lights and meters are mounted flush with the panel to provide protection for the tester meters. The latter used as master gages are of the moving coil, D'Arsonval type with an accuracy of within two per cent of full-scale deflection.

A two-kva voltage controller with
(Turn to page 123, please)

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FREE LITERATURE

Testing Equipment

Recently released is a booklet on a line of aircraft and automotive testing equipment. Units are available for production, engineering, maintenance, and military needs. *Sun Electric Corp.*

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Materials Handling

Catalog No. GC-52 contains data on gravity conveyors, powered conveyors, and hand trucks. Their sundry uses are outlined. *The Rapids-Standard Co., Inc.*

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Quenching Oils

Naphthenic-type quenching oils for industrial users are described in an illustrated booklet. They are said to have a natural detergency. *Sun Oil Co.*

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Lubricant History

Vol. 38, No. 12 of "Lubrication" features an account of the development and processing of lubricants for the period 1902-1952. *The Texas Co.*

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Hydraulic Presses

Recently issued is a 24-page catalog describing a line of hydraulic presses. Detailed specifications are given. *Versen Allsteel Press Co.*

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Power Transmission

Vol. I, No. 3 of "Transmission Topics," a golden anniversary issue, relates a half-century of power transmission development in the transportation and materials handling fields. *Fuller Manufacturing Co.*

Circle L-4 on postcard for free copy

Resin Properties

Now available is a folder (No. T-52) which details the advantageous qualities of Teflon, Du Pont's tetrafluoroethylene resin, and its broad range of applications. *Continental - Diamond Fibre Co.*

Circle L-7 on postcard for free copy

Brake Development

Now available is a colorful booklet "The Stopping Story" which describes the history of brakes from pioneer days to the present time. The manufacturer's Ausco Lambert Double-Disc brakes are also covered. *Auto Specialties Mfg. Co.*

Circle L-8 on postcard for free copy

Torque Converters

A brochure now ready for distribution describes a line of torque converters for gasoline or Diesel engines from 150 to 550 hp. Line drawings of each size are included. *Western Gear Works.*

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(Please turn page)

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L-3	L-9	L-15	L-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	P-5	P-11	P-17	P-23	P-29
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Bulletin No. 131 describes the 5-D Power-Flex automatic turret lathe. Various components of this versatile machine tool are carefully explained. *Potter & Johnson Co.*

Circle 1-10 on postcard for free copy

Catalog No. JB-952 describes air gaging of jet engine blades and buckets with Precisionaire jet blade checkers. Photos and diagrams illustrate the text. *The Sheffield Corp.*

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Catalog Section No. 105 covers a line of hydraulic cylinders offered in three pressure ranges. Detailed specifications are given. *Rivett Lathe & Grinder, Inc.*

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Vol. 14, No. 10 of "The Mainspring" contains an informative article entitled "Patrolling Spring Uniformity with a Simplified Control Chart." *Associated Spring Corp.*

Circle 1-11 on postcard for free copy

Vol. 2, No. 3 of "The Hydraulic Press" incorporates an account of the history and recent expansion program of the manufacturer. *The Hydraulic Press Manufacturing Co.*

Circle 14 on postcard for free copy

20-page booklet are several application data sheets for indicating specific requirements. *The Apex Machine & Tool Co.*

Circle L-16 on postcard for free copy

Recently re-issued is a photographic review of the manufacturer's production divisions. The 32-page, 150th-anniversary book features facilities for hydraulic press and valve manufacture. *R. D. Wood Co.*

Circle L-17 on postcard for free copy

Now available is a four-page folder (No. 117-48) entitled "Manufacturing Cost Control." It is designed to show how metalworking plants can cut costs with adequate cost control systems. *Harold F. Howard Co.*

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Fresh off the press is a brochure (Circular No. 557) which describes and pictures a variety of machine tools, cutting tools, and gages. **Pratt & Whitney, Div. Niles-Bement-Pond Co.**

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Now available is a booklet which contains detailed information on a \$30,000 mechanical design award program. *The James F. Lincoln Arc Welding Foundation.*

Circle 109 on postcard for free copy

Now available is an eight-page folder of interest to those engaged in metal forming work. Featured is Drawcote dry lubricant for use in drawing, forming, and extruding operations. *Gilon Products Co.*

Circle 141 on postcard for free copy

Now available is a 12-page booklet (Form No. 8065) describing the applications of undiluted coatings of powdered metals, such as tungsten carbide, to metal parts. *Linds Air Products Co.*

Circle 1-33 on postcard for free copy

(See preceding page)

USE THIS POSTCARD

Recently published is a brochure describing MasterMet alloys for the investment casting industry. A model plant for producing master heats of alloys in shot and ingot form is shown. Cannon-Muskegon Corp.

Circle 1-16 on postcard for free copy

Catalog No. 27 describes a line of universal joints for aircraft and industrial applications. Featured in the

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It's ready NOW! Yale's new Warehouser

Here's the narrow aisle straddle-type truck you've waited for... more efficient—far safer—thanks to new improved YALE design.

ELECTRIC POWER—and power to spare! There's almost no warehouse job that can't be done more efficiently and at lower cost with one man and the remarkable, trouble-free YALE Warehouser.

SHORTER LENGTH AND ROUNDED REAR END allows right-angle tiering in aisles 6' wide or less...doubling, tripling your present storage facilities without a cent of costly construction or remodeling.

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SAFER SCIENTIFIC DESIGN places controls in center of truck for driver protection...provides a single hydraulic lifting cylinder for far better visibility...gives never-failing "Dead Man" control that applies brakes and shuts off power the instant operator leaves truck.

Yes, the YALE Warehouser is the practical, money-saving answer to your modernization program. If you are considering new construction or the remodeling of your present storage facilities, consult with YALE...learn how this new, improved truck can help you get more use from every square unit of storage space.

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AUTOMOTIVE INDUSTRIES, January 15, 1953

67

NEW



AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Linear Motion Potentiometer

Now available is Model 108 linear motion potentiometer with precision wire-wound resistance elements for airborne and industrial electronic systems. It is said to be well suited for applications where a combination of miniaturization, ruggedness, and reliability is essential.

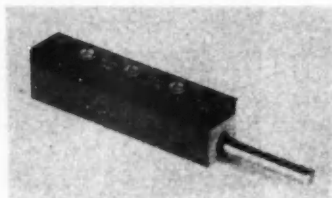
The rectangular, small, and lightweight unit reportedly embodies the utmost in sensitivity and accuracy. Linearity, tested by the continuous calibration method, is described as ± 0.5 per cent or better.

A resolution of .001 in. is said to be attainable with standard shaft travels of 1 5/16, 2 1/4, four and six inches. Intermediate travels are also available. It is claimed that this poten-

tiometer will withstand sustained acceleration of 100 g's and vibration of more than 1000 cps.

Standard resistances range from 1000 to 50,000 ohms. An output of at least 26 volts is attainable from this unit. *Bourns Laboratories.*

Circle P-1 on page 65 for more data



Bourns potentiometer.

High-Speed Spintesting Equipment

Now on the market is a line of test equipment for high-speed spinning of aircraft parts. Made in three sizes, the equipment is as follows: Model VHS-1—for testing a part up to 2500 lb and 55-in. diam. at 25,000 rpm; VHS-2—for testing a part up to 200 lb and 20-in. diam. at 60,000 rpm; and VHS-3—for testing a part up to 15 lb and 15-in. diam. at 100,000 rpm.

A high-speed testing unit consists of: vacuum service unit; spin pit and turbine; and remote control operating stand (shown in that order in cut).

The spin pit includes a cylindrical steel tank to whose upper end cover plate are attached the mounts of a drive turbine. The largest model is

set in concrete, while the two smaller models may be bench-mounted.

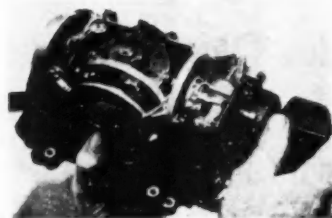
The service unit, provided with each pit, serves as a housing for the vacuum pumps, their drive motors, and controls. It also contains the lube oil system for supplying oil to the turbine bearings.

The control panel contains necessary pressure gages, electronic frequency meter, vacuum pump, and lube system controls. It also houses the switches for energizing the magnetic chuck and operating trip solenoid valves in the turbine steam or drive air lines. *Manufacturing Div., Warren Brothers Roads Co.*

Circle P-2 on page 65 for more data



Warren spintesting equipment.



Honeywell automatic pilot.

Jet Automatic Pilot

Recently developed is an automatic pilot that is said to guide jet fighters to their targets with electronic precision. Heart of the device is a "cageable vertical gyro" (see cut).

Automatic attack is accomplished by hooking up a radar and fire control system with the autopilot. The radar sees the target, the autopilot directs the plane to the target, and the guns fire automatically when in range.

The company has announced receipt of orders to install the autopilot, designated the E-11 by the Air Force, on the Douglas RB-66 twin-jet light bomber. *Aeronautical Div., Minneapolis-Honeywell Regulator Co.*

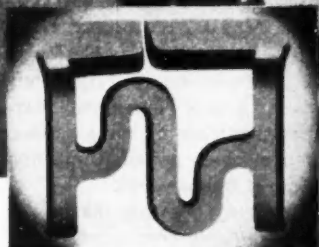
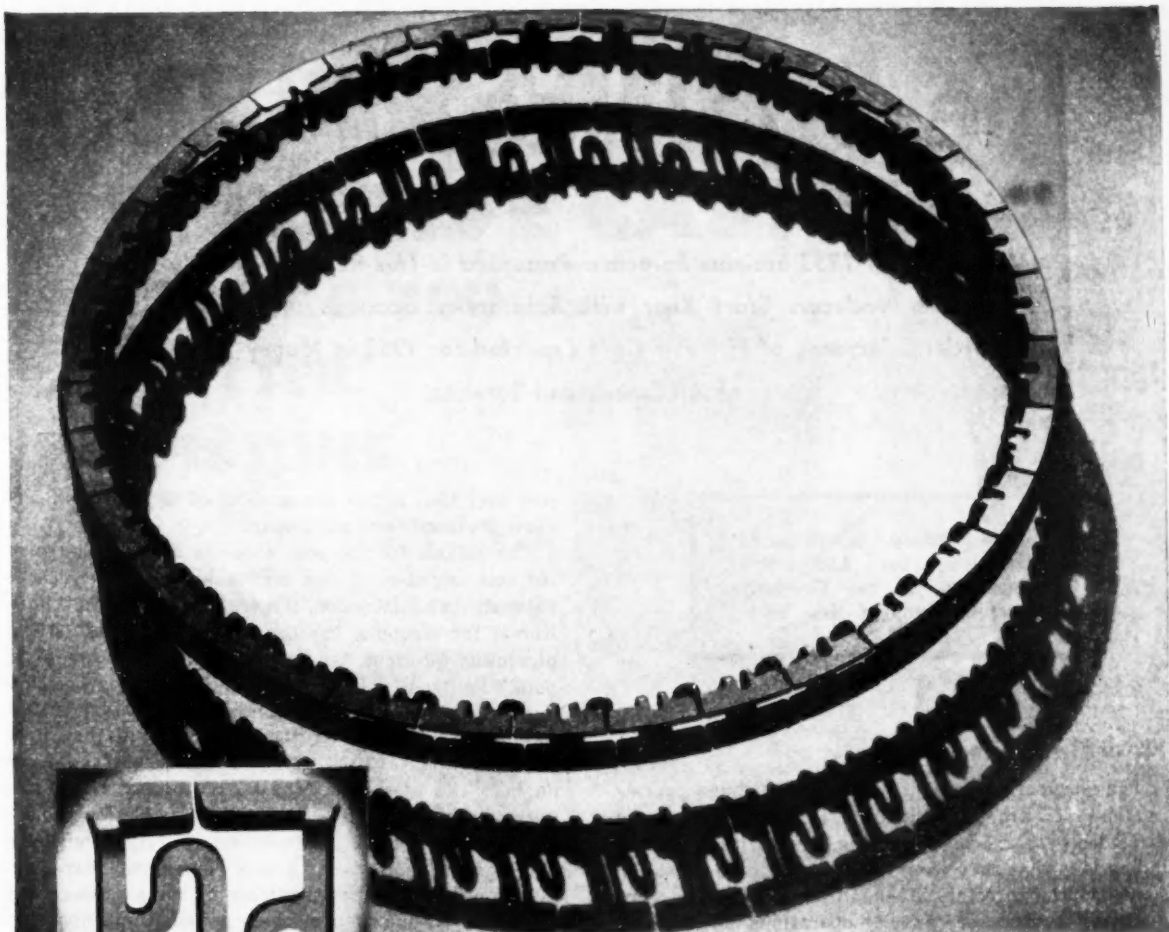
Circle P-3 on page 65 for more data

Ball Relay

Now available is a shock-proof, hermetically sealed relay that is said to be capable of operating at over 100 c per second. Intended for use on d-c circuits, the relay is reported to use magnetic balls as the contact medium to provide new contact surfaces on each operation and prevent mis-operation under vibration.

A non-magnetic plating on the balls and the pole pieces is claimed to provide a long-life contact and avoid sticking caused by current interruption. The pole pieces are insulated from each other and are the terminals of the circuit to be closed. Upon deenergizing, the balls release and fall to one side of the chamber and interrupt the circuit. *Magnex Corp.*

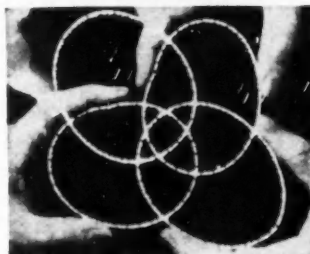
Circle P-4 on page 65 for more data



The exclusive "S" design prevents buckling or wavering when compressed.



This exclusive strut support in every sector of Sealed Power Flex-S assures flatness and stability for both upper and lower lands during up and down strokes and when changing direction.



Because of its extreme flexibility and uniform radial pressure, Sealed Power Flex-S conforms perfectly to tapered and out-of-round bores.

Announcing the revolutionary Sealed Power

flex-S

flexible steel oil ring

YEARS of research, designing, engineering, and testing preceded this announcement of the Sealed Power Flex-S Ring. Many tests have proved Sealed Power Flex-S superior to any other type of flexible oil ring.

Among its advantages are included better lubrication, less scuffing, greater oil economy, and longer ring life. THE EXCLUSIVE "S" DESIGN prevents buckling or wavering when compressed. It maintains true alignment. It is adaptable to an almost infinite range of unit pressure for specific installations. It is

easily assembled on the piston, hugs the groove, can't fall away.

Because of its extreme flexibility and uniform radial pressure, Sealed Power Flex-S conforms perfectly to tapered and out-of-round bores. Flutter and vibration are eliminated. Metering of oil between all sectors provides vital lubrication all around the bore—no ring gap, no "wet" side, no "dry" side. Cylinder bore wear is definitely retarded. Perfect oil drainage removes all chance of clogging, carbon, or gum deposits.

Let us tell you the complete story!

Sealed Power Corporation

MUSKEGON, MICHIGAN

The BUSINESS PULSE

Analysis of 1953 Business Forecasts Presented in This Report. Durable Goods Producers Start Year with Substantial Backlogs of Unfilled Orders. Increase of Five Per Cent Expected for 1953 in Money Value of All Goods and Services.

This Survey Is Prepared
Exclusively for AUTOMOTIVE
INDUSTRIES by the Guaranty
Trust Company of New York.

New Records

The old year ended with American business operating close to practical capacity. Employment, income and sales were at or near all-time highs, with numerous indications that they were likely to continue there for some months to come. Steel mills, for example, were generally booked for capacity operations through the first quarter of the year, and durable-goods producers had very substantial backlogs of unfilled orders.

Expansion during 1952 was not as rapid as in 1951, but on the whole the year was a prosperous one for most segments of the economy. Growth was somewhat retarded by the midsummer steel strike, which cost the nation approximately 20 million tons of ingot steel. Moreover, the fact that the use of manpower and resources had been increased very appreciably in the preceding year also tended to check the rate of expansion, since most of the slack in the economy had been eliminated before the year began.

Some firms saw profit margins narrow between rising costs and weakening market prices during the year; and some producers, such as farmers, had difficulty in maintaining dollar income in the face of the persistent decline in prices of basic commodities. Despite such tendencies toward lower profits in some lines, business in the aggregate was very good. Final figures, when they become available, will probably show an increase of about 5 per

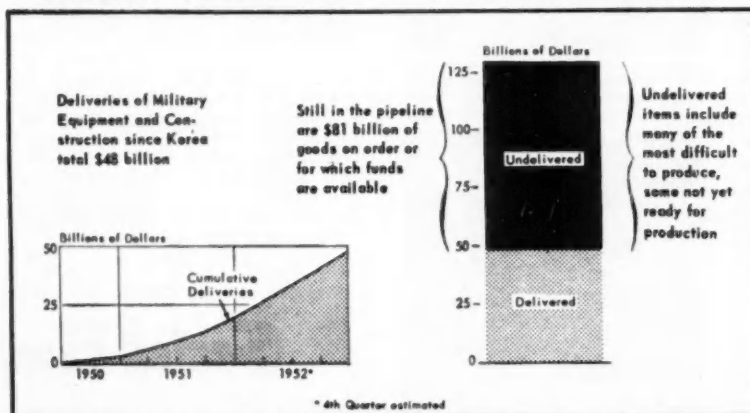
cent over 1951 in the money value of all goods and services produced during the year.

The outlook for the year ahead is indefinite in some respects because of the approaching change in the national Administration. General Eisenhower's trip to Korea, for example, has dramatically emphasized the possibility of some fundamental change in American policy in the Far East. Quite obviously, any decision on the part of the new Administration leading either to an intensification of the Korean conflict or to a cessation of hostilities would have a powerful impact on both the near- and long-term outlook. Therefore, until new policy lines—both in the Far East and elsewhere—are evolved, all forecasts of future business developments must be of a very contingent character. Such questions as the magnitude of budget reductions and as to when and how much personal and business taxes can be cut are as yet unanswered.

Notwithstanding the many question marks relating to the future, businessmen and economists have been very busy turning out forecasts in recent weeks, nearly all of them based on the assumption that international conditions will continue pretty much the same and that mobilization plans will not be materially altered.

There appears to be fairly general agreement among
(Turn to page 116, please)

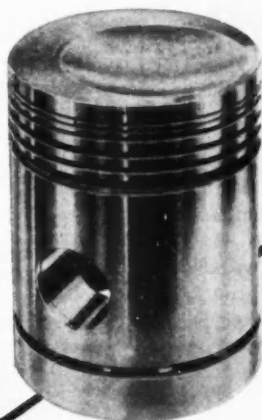
CURRENT STATUS OF MILITARY GOODS ORDERS



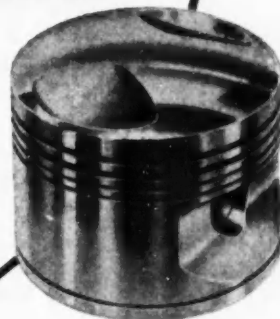
From Eighth Quarterly Report, Jan. 1, 1953, to the President by the Director of Defense Mobilization

Thompson's CREATIVE CASTING OFFERS YOU BETTER PISTONS

Diesel Heavy-Duty Piston



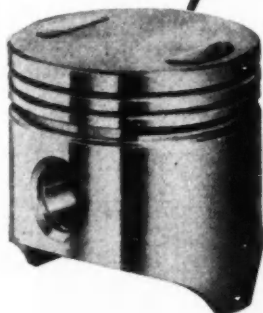
Aircraft Piston



Tractor Piston



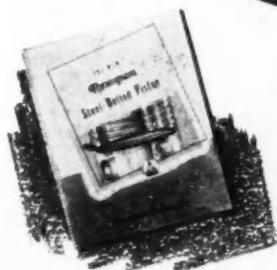
Steel-Belted Piston



OVER 50 YEARS of making precision parts for the automotive and aircraft industries . . . has given Thompson engineers opportunities to improve on many methods and materials.

"Creative Casting"—a Thompson development—makes possible the use of metals that withstand high temperature—that are strong—that are light-weight and can be cast to very close tolerances.

Whether it's a piston for an airplane, a passenger car, a heavy-duty truck or tractor engine—gasoline or diesel—you'll find that Thompson's Light Metals Division can make it better. Thompson's famous STEEL-BELTED PISTON is one example of a Thompson FIRST that gives better engine performance in cars, trucks, buses and tractors. Write or call and a competent representative will call to help you solve your piston problems.



Write on your company letterhead for a copy of this data book on Thompson's Steel-Belted Pistons.

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AIR BRIEFS



By **ROBERT McLARREN**

Fiftieth Anniversary

This year will witness virtually a year-long celebration of the golden anniversary of flight dating from the immortal Dec. 17, 1903, accomplishment of the Wright Brothers at Kitty Hawk, N. C. The year will be replete with speeches about "we are only at the beginning of the real dawn of aviation," just as they have been delivered every year for the past thirty or more. Unquestionably aviation has had the longest "beginning" and "dawning" of any of man's enterprises. It is this constant "promise" of aviation that seemingly characterizes it in the public mind.

Here is a plea for those who participate in celebrations during the year to speak of aviation's "being" here today as an accomplished fact, as an established instrument of commerce and as the prime defender of our liberties. Aviation was America's biggest business during World War II and it is rapidly approaching that rating again—it is hardly the infant described in the speeches. Nor were the Wright Brothers mere "mechanics" who stumbled upon a great secret for any engineer will tell you we are flying today in exactly the same manner as we were 50 years ago—a tribute to the truly monumental genius of these two men.

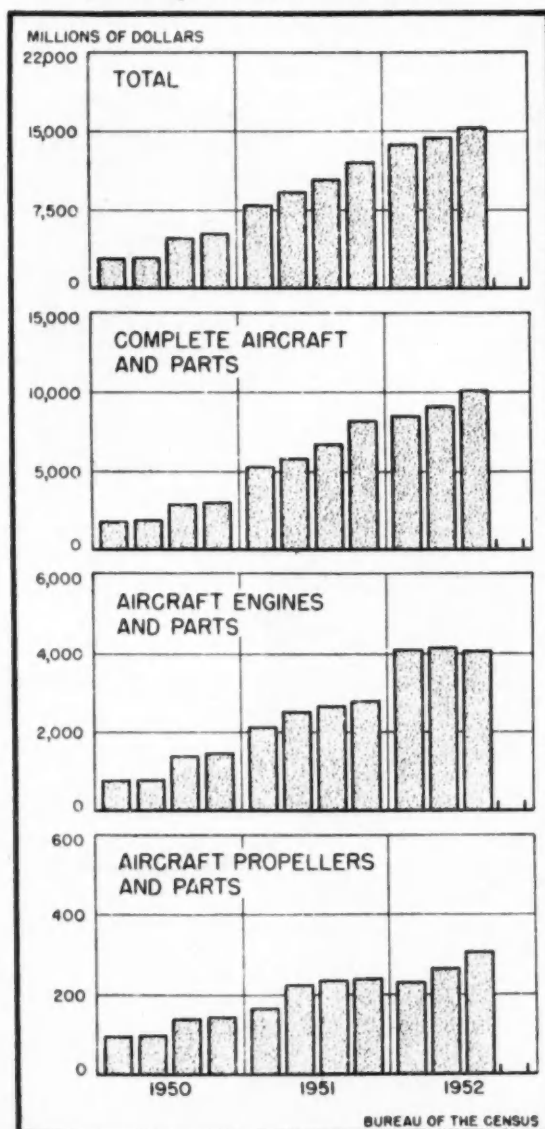
Industry Spanked

William Littlewood, American Airlines vice-president of engineering, has given the U. S. aircraft manufacturing industry a badly-needed spanking in his 16th Wright Brothers Lecture of the Institute of the Aeronautical Sciences. Littlewood, one of the great airlines engineers, pleads for common sense in the design, production and use of jet transports. Neither his own nor any other U. S. airline is going to buy a jet transport simply because it is jet-powered. It must be safer, more economical and more comfortable—regardless of its power plant or wing form—before it will find a market. He is only amused at the fantastic prices—as high as \$5 million each—being quoted by the industry for its jet transport designs. "They do not smack of reality," he says, "nor of any real desire to do the job, nor of any willingness to take a reasonable American industrial risk in doing it."

Littlewood is appalled at the present "secrecy" in the design of projected jet transport planes (Boeing will not let anyone see its new jet transport until it is rolled out of the factory—Douglas and Lockheed are

equally reticent about details) and says: "Jet transport design must reflect the prospective customer's (Turn to page 108, please)"

Backlog of Aircraft Orders





The Synchro-Start Solenoids are small and ruggedly constructed in a dust and splash proof case. They are used for operating throttles, fuel pump racks, chokes, anti-dieseling devices and controls.

Technical Data

Dimensions— $4\frac{1}{2}$ " x $3\frac{3}{4}$ " Voltages—6, 12, 24 and 32

Shipping Weight—3 pounds 10 pound pull with $\frac{1}{2}$ " stroke

Current Consumption—220 W pulling, 6.5 W holding

Either grounded or ungrounded

For further information ask for BULLETIN 410

SYNCHRO-START PRODUCTS, INC.
Automatic Engine Control Equipment

New Three-Shoe Brake

Combines

Air and Hydraulic Actuation

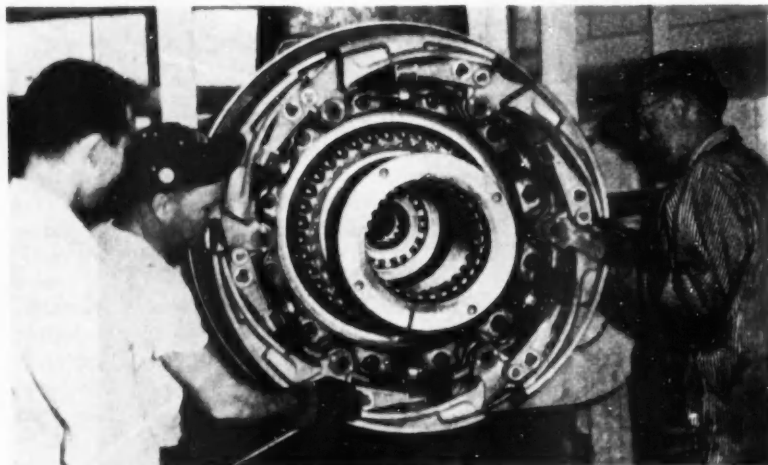


Fig. 3—For the Army Barc, Fawick developed an experimental brake system composed of a six-shoe assembly for each wheel, designed to operate in a 35-in. diameter brake drum. This assembly has six individual brake cylinders.

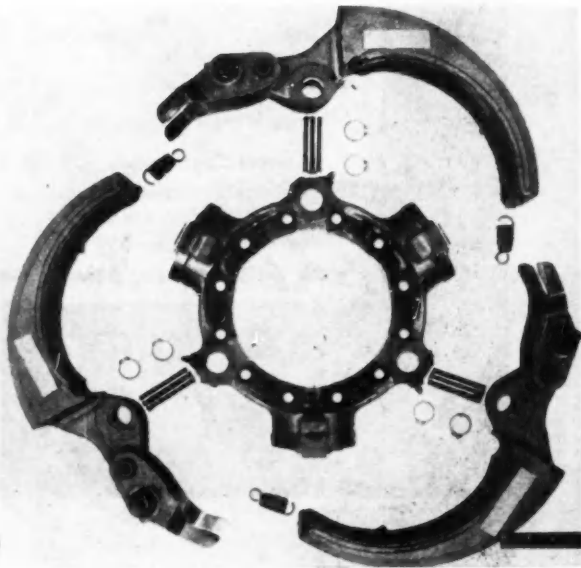
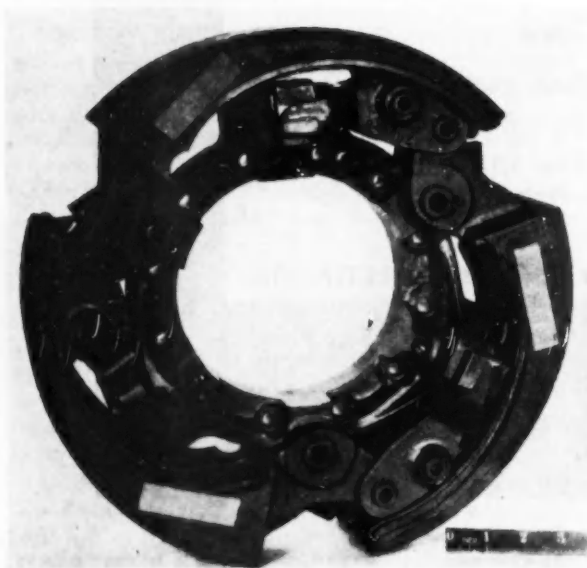
A HEAVY duty brake system for motor vehicles, offering some unusual features, has been introduced by the Fawick Brake Div., Federal Fawick Corp., Detroit, Mich. At the present writing the new system is being produced on an experimental basis for selected military vehicles and for specific civilian applications. Meanwhile, plans are under way to provide suitable manufacturing facilities some time in the near future.

As shown in Fig. 1 the Fawick brake features a basic self-energizing three-shoe design with a stepped brake cylinder for actuating each shoe. Individual shoes are linked in an extremely simple manner to the central spider and can be readily removed by removing three pins. The facility with which this can be done can be visualized from the exploded view in Fig. 2.

Perhaps one of its most distinctive features is the fact (Turn to page 87, please)

Fig. 1—Fawick brake assembly ready for installation. It is a self-contained assembly which can be removed readily from the backing plate as a unit. It is of three-shoe, self energizing design with an individual stepped brake cylinder actuating each shoe.

Fig. 2—This exploded view indicates the ease with which the Fawick brake can be quickly disassembled for inspection or replacement of parts.



HY-PRO SPECIALIZES IN PRODUCING TAPS!

AUTOMOTIVE INDUSTRIES, January 15, 1953

...to Save You Time and Money

Yes, we do specialize in tap production. To be exact, it makes up the bulk of our output. And because of this, our engineer specialists—in fact, our entire organization—concentrate their efforts on the design and perfection of one important line—Hy-Pro Taps.

Whatever your tapping needs may be—from a special design problem

to advice on your present production setup—these Hy-Pro Engineer specialists are ready to work closely with you.

Call us today for full information about Hy-Pro's services. We offer you a complete line of taps, and with it the know-how that only specialization in one field can produce.



HY-PRO TOOL CO., NEW BEDFORD, MASS., U.S.A.

New Defense Facilities

SUPPLEMENTING the list of certificates of Necessity issued up to November 12 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the December 15 issue, page 142, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Defense Production

Administration, Nov. 12 to Dec. 24, 1952.

Included in this latest tabulation, 14,967 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being \$23,876,017,000. These figures are exclusive of cases that are up for later review but included in this list

—in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

— A —

Accessory Products Co., Whittier, Calif.

Aircraft parts—\$68,000 (55)

American Car & Foundry Co., Berwick, Pa.

Ordinance—\$184,908 (70)

American Locomotive Co., Auburn, N. Y.

Diesel-electric locomotive engines—\$223,800 (50)

— B —

B. and E. Tool Co., Inc., Westfield, Mass.

Aircraft parts—\$26,241 (70)

Beacon Machine Co., Inc., East Hartford, Conn.

Aircraft parts—\$35,000 (45)

Boeing Airplane Co., Seattle, Wash.

Aircraft—\$120,000 (60)

Borg Products Div., George W. Borg Corp., Delavan, Wis.

Ordinance—\$7,840 (65)

William Brewer Machine Co., Hartford, Conn.

Ordinance—\$11,493 (70)

Briggs Mfg. Co., Detroit, Mich.

Aircraft parts—\$38,000 (40)

Burroughs Adding Machine Co., Plymouth, Mich.

Aircraft instruments — \$220,525 (65)

— C —

C. & E. Manufacturing Co., Detroit, Mich.

Aircraft parts—\$5,161 (75)

C & L Precision, Inc., Stamford, Conn.

Aircraft parts—\$16,146 (70)

Cheney Bigelow Wire Works, Springfield, Mass.

Ordinance—\$20,444 (70)

Curtis Automotive Devices, Inc., Bedford, Ind.

Aircraft parts—\$39,277 (55)

— D —

Deere Mfg. Co., Waterloo, Iowa

Ordinance—\$82,110 (65)

Douglas Aircraft Co., Inc., Bell, Calif.

Airplane subassemblies and parts—\$64,673 (55)

— E —

Thomas A. Edison, Inc., E. Orange, N. J.

Aircraft components—\$149,068 (65)

Electric Auto-Lite Co., Toledo, Ohio

Aircraft components — \$1,637,500 (40)



We have fewer rejects since we installed a BLAKESLEE metal parts washer

NIAGARA METAL PARTS WASHERS assure 100% grease-free surfaces for subsequent finishing operations. Blakeslee sprays are designed to reach all surfaces. Each machine is designed to do your cleaning job thoroughly. You can depend upon Blakeslee engineering experience to solve your particular cleaning problems. "We have fewer rejects since we installed a BLAKESLEE metal parts washer."


Write today for full information

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CHICAGO • NEW YORK • TORONTO

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1844 So. 52nd Ave.
CHICAGO 50, ILL.

SOLVENT VAPOR DEGREASERS
in standard or special conveyor models
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G. S. BLAKESLEE & CO., LTD.
10 Cranfield Rd.
TORONTO 13, ONTARIO

NIAGARA-METAL PARTS WASHERS—built to fit your needs



How the casting

of a camshaft saved industry

\$42,000,000!

Only a few engine builders realized back in 1932 that Campbell, Wyant and Cannon really had something in the *cast* camshaft. Since that time, many others found that CWC's casting process could make important cost reductions and together they saved over \$42,000,000. Together they bought from CWC 33,000,000 *cast* camshafts!

CWC *cast* camshafts are *produced* at a lower cost! Made of electric furnace alloyed metal, they require *less* machining and *easier* machining. They permit unrestricted engine design—positive control of Brinnell specifications—eliminate heat treating—and resist corrosion and wear. Regardless of the number of engines you make—the same proportionate savings can be yours with CWC *cast* camshafts!

CAMPBELL, WYANT AND CANNON
FOUNDRY COMPANY

Muskegon, Michigan



CWC

Since 1908

METALLURGICAL ENGINEERING provides unlimited possibilities in product design

PRECISION CONTROL assures the desired casting

MECHANIZATION to produce castings at reasonable cost

(Advertisement)

AMERICAN CHEMICAL PAINT COMPANY

AMBLER  PENNA.

Technical Service Data Sheet

Subject: INDEX OF ACP CHEMICALS FOR METAL PRESERVATION AND PAINT PROTECTION

METAL	OPERATION	ACP CHEMICAL
ALUMINUM	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Preparation for Painting	"ALODINE" "DURIDINE" "DEOXIDINE"
	Protection from Corrosion	"ALODINE"
BRASS	Brightening	"ACP BRIGHT DIP"
	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "CUPROTEK"
	Corrosion Prevention	"CUPROTEK"
	Soldering Flux	"FLOSOL"
COPPER, BERYLLIUM, AND COPPER ALLOYS	Brightening	"ACP BRIGHT DIP"
	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "CUPROTEK"
	Coating Steel with Copper	"CUPRODINE"
	Corrosion Prevention	"CUPROTEK"
	Scale Modification	"RIDOXINE"
	Soldering Flux	"FLOSOL"
	Stripping Copper Coatings	"ACP COPPER STRIPPING SOLUTION"
GALVANIZED IRON, ZINC, AND CADMIUM	Cleaning	"DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Corrosion Proofing	"ZINODINE"
	Paint Bonding	"ZINODINE"
	Phosphate Coating, in Preparation for Painting	"LITHOFORM"
	Soldering Flux	"FLOSOL"
IRON AND STEEL	Chromate Coating, in Preparation for Painting	"CROMODINE"
	Cleaning	"ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "DURIDINE"
	Coating with Copper	"CUPRODINE"
	Drawing and Extrusion	"GRANODRAW"
	Paint Bonding	"CROMODINE" "DURIDINE" "GRANODINE" "PERMADINE"
	Paint Stripping	"THERMOIL-GRANODINE"
	Phosphate Coating, in Preparation for Painting	"CAUSTIC SODA AND SOLVENT NO. 3"
		"DURIDINE" "GRANODINE" "PERMADINE"
		"THERMOIL-GRANODINE"
	Phosphate Coating, to Protect Friction Surfaces	"THERMOIL-GRANODINE"
	Pickling with Inhibited Acids	"RODINE"
	Rust Prevention for Unpainted Iron	"PEROLINE"
	Rust Proofing	"PERMADINE"
		"THERMOIL-GRANODINE"
	Rust Removal—Brush, Dip, or Spray	"DEOXIDINE"
	Soldering Flux	"FLOSOL"
MAGNESIUM	Cleaning	"DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Pickling	"RODINE (M-200)"
STAINLESS STEEL	Cleaning	"DEOXIDINE"
	Coating with Copper	"CUPRODINE"
	Pickle Polishing	"RODINE"
	Soldering Flux	"FLOSOL"



WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS



— F —

Farmingdale Machine & Tool Co., Inc., Farmingdale, N. Y.
Aircraft parts—\$34,272 (70)
Fletcher Aviation Corp., Los Angeles County, Calif.
Aircraft parts—\$1,352,770 (60)
The Flour City Ornamental Iron Company, Minneapolis, Minn.
Aircraft components—\$79,540 (70)
Aircraft components—\$17,223 (70)

— G —

General Electric Co., Bridgeport, Conn.
Electronic equipment—\$303,232 (65)
General Electric Co., Waterford, N. Y.
Methyl chloride—\$10,410,000 (60)
Globe American Corp., Kokomo, Ind.
Ordnance—\$57,750 (40)
Ordnance—\$161,034 (50)
General Motors Corp., Bedford, Ind.
Aircraft parts—\$261,950 (65)

— H —

The Hobart Mfg. Co., Miami County, Ohio
Ordnance—\$222,134 (65)
Holsman Mfg. Co., Cuyahoga, Ohio
Aircraft & ordnance parts—\$13,871 (70)
Honeycomb Structures Co., Inc., Los Angeles, Calif.
Honeycomb structural sections for aircraft—\$217,852 (65)
Hoover Electric Co., Los Angeles, Calif.
Aircraft components—\$143,506 (60)

— L —

The Lake Shore Machine Co., Euclid, Ohio
Aircraft parts—\$11,711 (70)
Lengley Corp., San Diego, Calif.
Aircraft parts—\$275,000 (45)
Lockheed Aircraft Corp., Burbank, Calif.
Aircraft & related parts—\$96,133 (50)
Aircraft & aircraft parts—\$73,810 (60)
Lundberg Mfg. Co., Inc., Jackson, Mich.
Aircraft parts—\$150,000 (45)
Luscombe Airplane Corp., Garland, Tex.
Aircraft assemblies—\$412,000 (45)



— M —

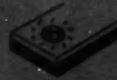
Manchester Machine & Tool Co., Summit County, Ohio
Aircraft parts—\$37,203 (70)
Michigan Steel Casting Co., Detroit, Mich.
Aircraft parts—\$3,484 (70)
Minneapolis-Honeywell Regulator Co., Phila., Pa.
Electronic equipment—\$46,075 (65)

They can't forget the
lock washer

KEPS...

THE PRE-ASSEMBLED NUT AND SHAKEPROOF® LOCK WASHER

Stop worrying about loose connections...  use KEPS! Every nut is sure
to be locked tight, the SHAKEPROOF Lock Washer  can't fall off.

Tapered-twisted teeth  bite deep to assure positive vibration protection
against loosening. Try KEPS now!

FREE...

TESTING SAMPLE KIT

...make your own tests on your own products...
see how KEPS hold tighter, improve product
quality and save time. Send for your kit now!



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"Fastening Headquarters"

DIVISION OF ILLINOIS TOOL WORKS
21 Charles Road, Elgin, Illinois • Offices in principal cities
in Canada: Canada (Pac) Tools Limited, Toronto, Ontario

America's great resources plus a free economy made this business possible!

Electronic equipment—\$16,631 (65)
 Montrose Div., Bendix Corp., Susquehanna County, Pa.
 Components for military end items—\$97,970 (45)

— N —

Nasco, Inc., Independence, Ohio
 Aircraft parts—\$237,662 (60)
 The New York Air Brake Co., Watertown, N. Y.
 Aircraft parts—\$159,375 (65)
 Northrop Aircraft, Inc., Hawthorne, Calif.
 Aircraft parts—\$56,963 (60)

— O —
 The Oliver Corp., South Bend, Ind.
 Ordnance—\$9,815 (65)
 Oxwell, Inc., Wellington, Kans.
 Aircraft parts—\$6,319 (70)

— P —

Palmer Mfg. Co., Cleveland, Ohio
 Ordnance—\$10,613 (70)
 Pemco, Inc., Independence, Ohio
 Aircraft & ordnance parts—\$264,908 (55)

— R —

Reech Aircraft Corp., Wichita, Kans.
 Aircraft—\$154,038 (60)
 Rex Machine and Tool Co., Inc., Winchester, Mass.
 Ordnance—\$18,167 (65)
 M. H. Rhodes, Inc., Hartford, Conn.
 Ordnance—\$14,871 (70)
 Roller-Smith Corp., Bethlehem, Pa.
 Electrical indicating instruments—\$175,742 (60)
 Ronson Art Metal Works, Inc., Essex County, N. J.
 Aircraft parts—\$8,268 (65)
 Ryan Aeronautical Co., San Diego, Calif.
 Aircraft components—\$19,800 (65)
 Ryan Industries, Inc., Detroit, Mich.
 Aircraft instruments—\$98,002 (45)

— S —

Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
 Ordnance—\$135,725 (60)
 The Schaible Co., Mariemont, Ohio
 Ordnance—\$2,353,193 (55)
 Seren Tool & Mfg. Co., Chicago, Ill.
 Ordnance & aircraft parts—\$131,448 (70)
 Ferdinand J. Snow Co., Westwood, N. J.
 Aircraft & ordnance parts—\$121,300 (60)
 Stewart-Warner Corp., Bridgeport, Conn.
 Ordnance—\$13,165 (65)
 The Stubnitz Greene Spring Corp., Adrian, Mich.
 Ordnance—\$3,626 (65)

— T —

The Tubular Products Co., New Britain, Conn.
 Aircraft parts—\$148,200 (40)

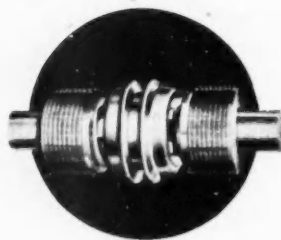
— V —

Vulcan Machine Co., Waynesboro, Pa.
 Ordnance—\$77,000 (45)

— W —

Waltham Watch Co., Waltham, Mass.
 Aircraft instruments—\$58,656 (65)
 Western Electric Co., Inc., Burlington, N. C.
 Ordnance and aircraft parts—\$10,861 (65)
 Western Electric Co., Inc., Forsyth County, N. C.
 Aircraft parts—\$7,941 (65)
 Westinghouse Electric Corp., E. Pittsburgh, Pa.
 Circuit breakers & switch gear—\$1,653,658 (60)
 Wilcar Co., Nassau County, N. Y.
 Aircraft parts—\$8,010 (70)

Engine Crankshaft Driven



Friction-Reversing Winch

Koenig Iron Work's KING Front End Jeep WINCH raises, lowers and releases loads on the cable, providing forward, reverse and neutral control where the prime mover supplies only one-direction drive. ROCKFORD CLUTCHES help these Jeep winches "perform yeoman service under rough handling and with little care." Let ROCKFORD clutch engineers help solve your power control problems.

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 315 Catherine Street, Rockford, Illinois, U.S.A.

ROCKFORD CLUTCHES



B-W
 ENGINEERING
 MAKES IT
 WORK

B-W
 PRODUCTION
 MAKES IT
 AVAILABLE



ENGINEERING
 BULLETIN
 SENT ON
 REQUEST

Power Steering RINGS

ARE A MUSKEGON SPECIALTY!



The advantages of Muskegon metallic fluid seal rings for dirt sealing, extrusion, ... deterioration, ... swelling ... and excessive friction, are well established.

Because of engineering collaboration through the earliest stages of power steering development, Muskegon is able now to offer the broadest application of metallic fluid seal rings—including the all-steel, all-metallic "Multi-Seal," an exclusive Muskegon development—in various diameters, designs and tensile ranges.

For information regarding the superior performance and wear characteristics of Muskegon Metallic Seal Rings, communicate with:

Muskegon Piston Ring Co., Muskegon, Mich.
Detroit Office: 721 New Center Building
Telephone TRunk 2-2113

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MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE GILBERT SOURCE"

Make Your Temperature CONTROL More EXACT



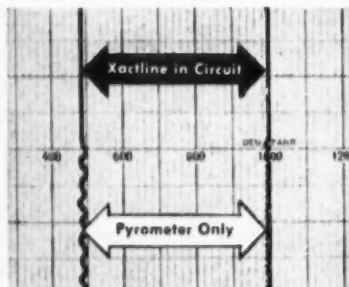
It's Easy with

XACTLINE

and it's automatic . . .

Your present indicating or recording pyrometer controls can be made to function more precisely—minimizing overshooting and undershooting—to meet the closest temperature-control requirement.

Simply introducing the XACTLINE into the control circuit will give you this "Straight-Line" temperature control. It automatically anticipates temperature changes before they occur—producing a short on-off cycle. Unusually sensitive performance is due to the complete electric operation—no moving mechanical parts. No adjustment or coordination with the control instrument is necessary regardless of the size of the furnace—electric or fuel fired—length of the heating cycle, or size of the load.



Exact reproduction of temperature chart for a heating process showing the comparison of the "Straight-Line" temperature control produced by XACTLINE and the saw-tooth curve obtained with only conventional control.

PRICE \$89.50 F.O.B. CHICAGO

115 or 230 Volts, 60 Cycle.

Complete installation instructions. 4321

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CLAUD S. GORDON CO.
Manufacturers • Engineers • Distributors

Metallurgical Testing Machines • Temperature Control Instruments • Thermocouples & Accessories • Industrial Furnaces & Ovens

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Dept. 13 • 2035 Hamilton Ave., Cleveland 14, Ohio

MEN in the NEWS

(Continued from page 25)

Aircraft Industries Association — **Mundy I. Peale**, president of Republic Aviation Corp., has been elected chairman of the board of governors for the first six months of 1953, and **Oliver P. Echols**, chairman of Northrop Aircraft, Inc., was elected chairman for the second half. **Adm. DeWitt C. Ramsey (USN Ret.)** was elected president for the year.

Weber Aircraft Corp.—**C. W. Merritt** is now a field engineer in the product development department.

Firestone Tire & Rubber Co.—Promotion of **Herbert H. Wiedenmann** to factory manager of Akron plants 1 and 2 has been announced.

Bell Aircraft Corp.—**Joseph R. Burns** will head the new process and manufacturing research group.

Brunswick Ordnance Corp. div. of Mack Trucks, Inc.—**W. Denis Kendall** has joined the firm as executive vice-president and general manager.

Hendey Machine Co.—Recent elections made **Edgar G. Seybold** executive vice-president and director, **Bernard Sassen** vice-president in charge of engineering, and **Helge G. Hoglund** vice-president in charge of sales.

Clearing Machine Corp.—**David D. Wallace** will manage operations in London, England.

Illinois Tool Works — **E. U. T. Berthelsen** and **K. C. MacKay** have been appointed assistants to the manager of the Shakeproof Div.

Fleet Aircraft Mfg. Co. — **H. L. Roberts** has transferred from Canadair to be managing director.

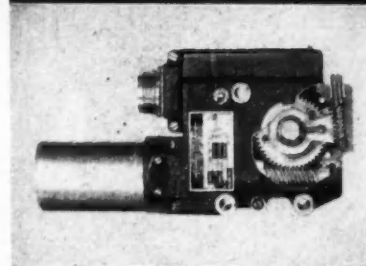
Industrial Lubricants Co. — **W. C. Kennedy** has been appointed general sales manager, and **Hubert E. Evans** is now chief chemist.

Pioneer Engineering and Mfg. Co. — **Michael Pinto** succeeds **A. M. Sargent** as president. He has named **L. A. Curnoe** as secretary-treasurer and **Clyde Mooney** as chief engineer.

Farrand Optical Co.—**R. A. Hamilton**, formerly with Lockheed, has joined the firm as consulting engineer in the optical tooling division.

(Turn to page 154, please)

Jato Release on Republic's F-84 AIRBORNE Actuated



The R-424 actuator (R-450 type) jettisons six Jato bottles after take off. The R-424 winds cables on a drum and pulls the pins.

This cutaway of Airborne's Model R-450 actuator shows the externally adjustable positive stops which, in conjunction with torque-limiting switches, provide accurate positioning at both extremes of travel. The limit may be at any value to 270°.

Projection of the splined output shaft, on both sides of the actuator, helps adapt the model R-450 to any application. The weight of this unit, with radio noise filter, is 2.7 pounds—the speed, at 26 volts and 250 pound-inch load, is 5 rpm.

See our insert in the I.A.S. Aeronautical Engineering Catalog for details on this and other Airborne actuators.

AIRBORNE

ACCESSORIES CORPORATION

1414 Chestnut Avenue Hillside 5, New Jersey

Production Pointers

from

GISHOLT



TIME-
SAVING
IDEAS



Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.

SHOWS MODERN TREND IN BALANCING

Machine Balances And Corrects 100 Fans Per Hour

Today, industry *knows* the importance of balancing rotating parts, large and small. It's fast becoming a regular part of production...and production balancing more and more is combining the complete balancing process in *one* machine.

It's being done here:

The part is a small fan for a well-known vacuum sweeper. One Gisholt DYNETRIC Balancer with correction equipment as an integral part of the machine, handles the full production—locating, measuring and correcting static unbalance at a rate of 100 fans per hour.

Locating and measuring unbalance is a matter of only a few seconds. The operator then turns the fan to the proper angle and turns a hand-wheel to correspond with the meter reading. At the press of a button, a fly-cutter removes the exact amount of metal to bring the fan into balance.

Thus, the *entire* job—locating and measuring unbalance, correction and

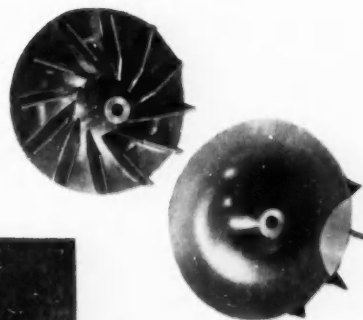
inspection for over-all accuracy—is done in one operation. It saves handling. Only one loading is necessary.

With this entire balancing operation averaging only 30 seconds, the balancing cost is repaid many times by the greater smoothness, quietness and longer life of the fans.

DYNETRIC
BALANCERS



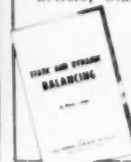
DEVELOPED JOINTLY WITH
WESTINGHOUSE ELECTRIC CORPORATION
"DYNETRIC" IS A TRADE MARK
AND IS A PAT. OFFICE OF
WESTINGHOUSE ELECTRIC CORPORATION



Front and back of fan with metal removed to correct unbalance.

HELPFUL INFORMATION

on balancing is given in the article, "Static and Dynamic Balancing" from the latest A.S.T.E. Handbook. Will be glad to mail you a reprint.



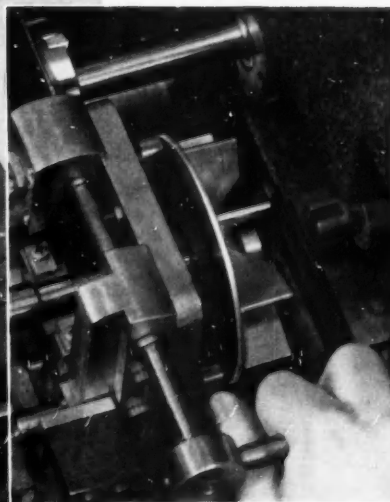
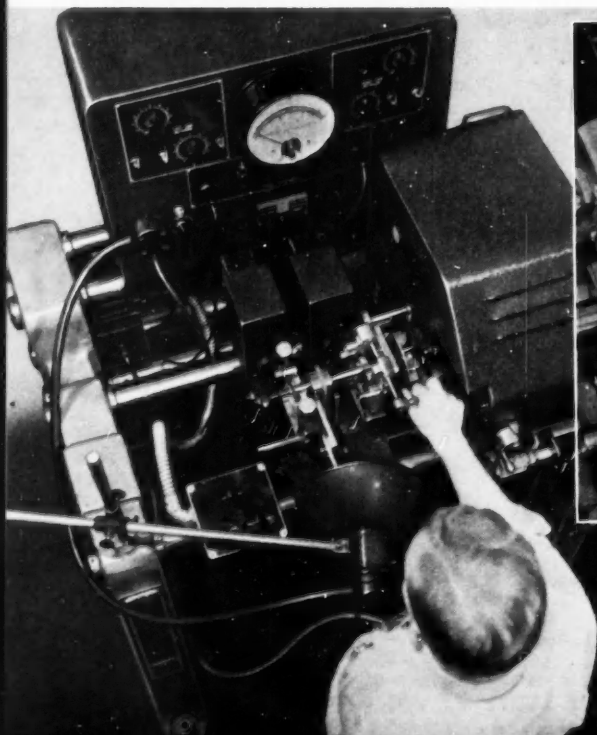
BALANCING SCHOOL.



Ask for details and starting dates of the Gisholt Balancing School, industry's only complete training program.

Close-up showing method of correcting unbalance by use of fly-cutter.

Gisholt Balancing Machine with integral correction equipment.





FOR MORE PRODUCTION FROM

HOW CAREFUL PLANNING SAVES 2nd OPERATION

Two-Stage Setup on Simplimatic Provides Answers

TIME-
SAVING
IDEAS

Here's ingenuity at work again.

This Simplimatic Automatic Lathe is making real savings in the machining of these 4½" rock bits for oil well drilling. Here's the story:

Loading—Initial alignment is very important. This is assured by a special loading fixture. The bit, complete with cutters, is loaded into the swing-

ing air-operated cup fixture which holds it on the spindle centerline. An air-operated drawbar then pulls the loading fixture against locating stops. The chucking fixture is engaged and the piece is ready for machining.

1st Stage—An angular slide moves in to center the bore. With this done, it retracts and the tailstock center comes in to support the shank for the heavy cuts to follow. All this is part of the completely automatic cycle.

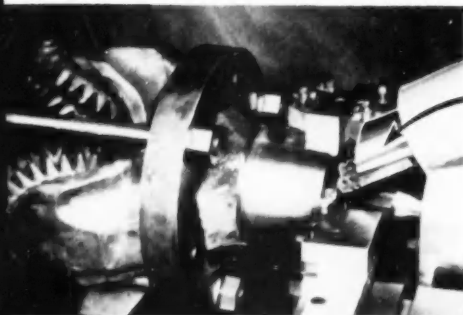
2nd Stage—With the center in place, tools on the front slide taper turn the shank, which is made up of three welded sections. Tools on the rear slide chamfer and turn the face.

Remember, all this is done in a single automatic operation...and the

time is only 2.25 minutes. Production-wise, this Simplimatic (which handles a number of different size bits) is producing at a rate equal to three hand-operated turret lathes.

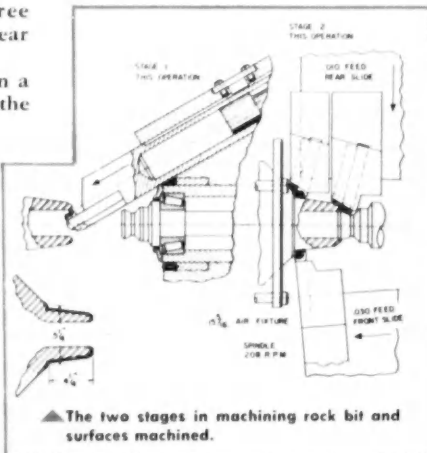
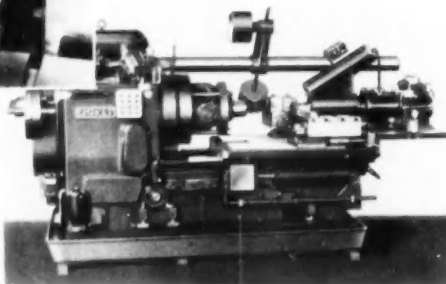
The machining of these parts is reduced to a one-chucking job by the addition of a special tool slide for centering the workpiece.

This is just one of 31 interesting jobs shown in the all-new Simplimatic catalog. Write for your copy today.



Close-up of tool slide extended to cut center in bit shank. Slide then retracts and tailstock comes in to support the shank.

Simplimatic with special tailstock tool slide and swinging fixture for loading and unloading.



CAMSHAFTS GET QUICK CLEANUP IN THIS HIGH-PRODUCTION SETUP

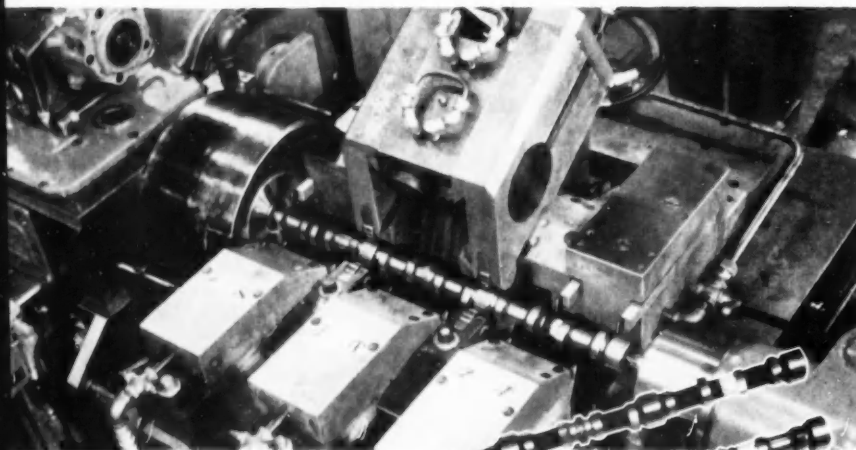
Uses No. 12 Hydraulic Automatic Lathe

This job, cleanup operations on a six-cylinder camshaft, shows the kind of top speed, highly efficient setup demanded by the automotive industry.

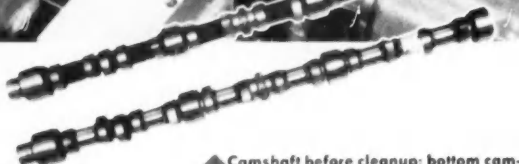
A driver and center hold the forging. To give the long, thin camshafts the support required to prevent distortion and whip, there are two sets of intermediate rollers. The top rollers move in automatically before the cut is started and retract for unloading.

Slides and carriages are tied together in pairs to handle the entire length of the camshaft. The six diameters of the camshaft are turned by tools at the front. Form tools at the rear then plunge cut and clean up. Time per camshaft is 0.4 minute.

The fully automatic cycle of the No. 12 Hydraulic Lathe simplifies and speeds cleanup work on these automotive camshafts.



Tool setup for camshaft cleanup work. Note top and bottom supports.



Camshaft before cleanup; bottom camshaft after machining.



LOOK AHEAD... KEEP AHEAD... WITH GISHOLT



TIME-
SAVING
IDEAS

WHERE C/F TURRET LATHE REALLY PAYS OFF

Inside Work Done with Ease

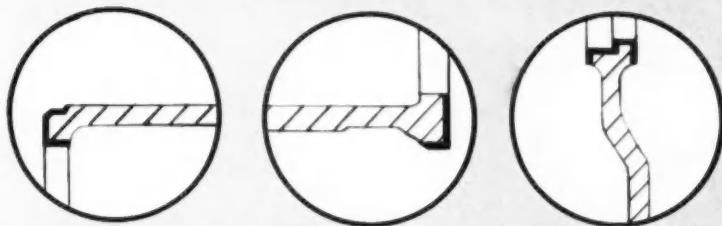
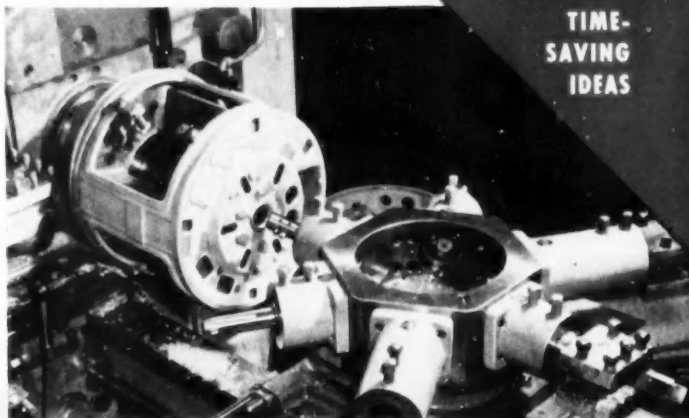
The two problems faced in the machining of these housings were (1) holding of the thin wall part and, (2) back facing the center bore. A special face plate fixture with draw-back clamps provided the careful chucking answer.

As for machining, the job might well have involved several operations with special tooling. However, the 2L Saddle Type Turret Lathe with its cross-feeding turret solved this problem. With the sliding hexagon turret, simple standard tools handle a number of different surfaces, including the back face and counterbore shown at the right in the drawing. Moreover, by doing the job in one chucking, concentricity is assured on the many different diameters.

With the cross-feeding turret, you can feed both laterally and longitudinally. Thus you can use simple tooling and can quickly change over to other types of work.

Simple tooling, plus the cross-feeding turret of this Saddle Type Lathe, add up to big savings on this interesting job.

Simple setup for machining awkward, thin-wall part.



Operations, including back facing, performed on this job.

GOOD TURRET LATHE SETUP FOR SMALL BRASS PARTS

Ram Type Lathe Handles Parts in 5 Sizes

Here's a business-like setup for machining cast-brass plug bodies on a No. 3 Ram Type Turret Lathe. Held on the inside hex diameter by special jaws on an aluminum chuck, a combination turning, boring and facing tool on the first station does the bulk of the work.

Knurling follows at the next station with the required rough finish put on

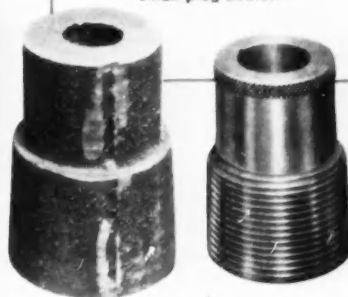
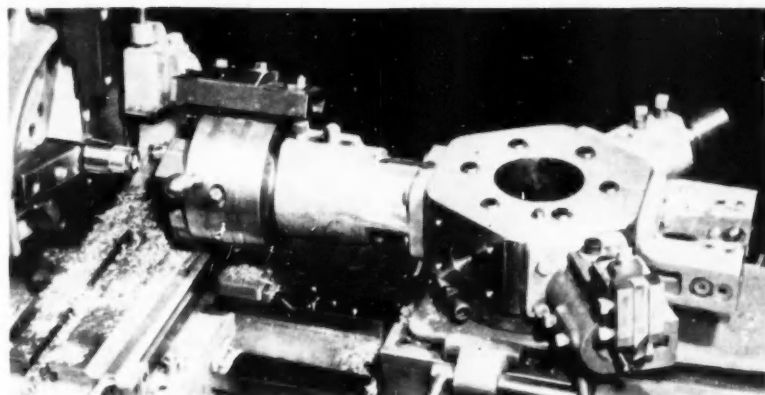
450 f.p.m. The third station is merely a revolving center which supports the end while a shave tool on the rear of the cross slide forms the taper O.D. At the last station, the taper is threaded by a special self-opening die head.

On a test run, this plug was machined in 0.84 minute, floor-to-floor. In addition, four other sizes, ranging from 1 1/4" to 2 3/16" O.D. are handled.

This user is time ahead by a fine job of tooling and a fast ram type lathe.



Work performed on the small plug bodies.



Before and after view of cast-brass plug body.

Final operation on the cast plug body is threading the taper.





TIME-
SAVING
IDEAS

JOB SWITCHED TO FASTERMATIC— PRODUCTION DOUBLED



Complicated Form Machined with Ease

There was a 140% speedup in first-operation machining of these propeller nose nuts when the job went to the Fastermatic Automatic Turret Lathe. Time now is 5.0 minutes as against 12 minutes on a hand-operated machine.

The drawing shows the many surfaces to be handled. Working at five separate feeds, conventional tools rough and finish bore, turn and face. Doing the taper bore is a simple mat-

ter with the help of a turret facing attachment guided by a cam bar on the rear independent slide. A necking tool operated by an overhead stop bar does the recess in the bore.

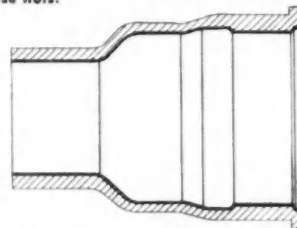
Other advantages of the Fastermatic for this job are that no further finishing is required and its repeat accuracy has virtually eliminated spoilage.

Using standard tools, and in a continuous automatic cycle, this Fastermatic cuts tool costs and machining time in first operation work on these parts.



▲ Before and after machining.

◀ Simple setup for first operation on propeller nose nuts.



Heavy lines show surfaces machined by Fastermatic.

Good News on Deliveries! Production has been stepped up again on 1F and 2F Fastermatics. Check your requirements with your Gisholt representative now.

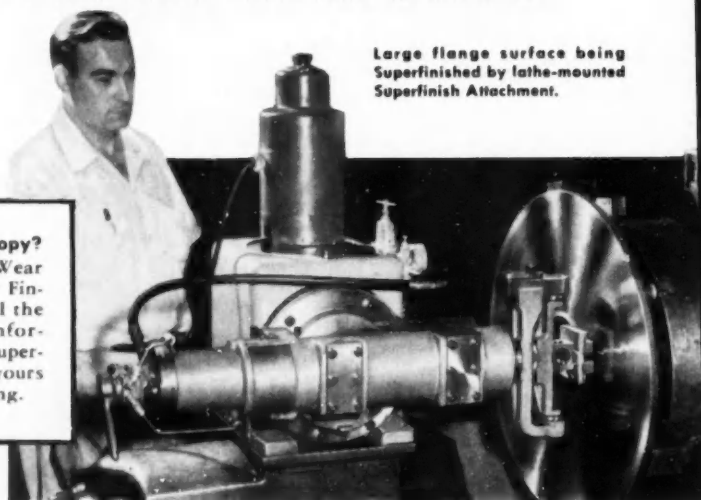
COST-SAVING IDEA FOR SUPERFINISHING

Mounts on Lathe to Provide Better Surfaces at Lower Cost

This beam flange for textile equipment is a far better product since Superfinishing has a part in its making. Yet, the investment in Superfinishing equipment is surprisingly low...the manufacturer simply mounted a Superfinish Attachment on the tool post of his engine lathe.

Formerly, the flange face was turned and then ground. Now, grinding has been eliminated and Superfinishing gives him a far better surface...in less time and at lower cost.

With a lathe-mounted Superfinish Attachment, this user is gaining important savings in grinding time while getting better, smoother, longer wearing surfaces.



Large flange surface being Superfinished by lathe-mounted Superfinish Attachment.

Have your copy?

The book, "Wear and Surface Finish" has all the facts and information on Superfinish. It's yours for the asking.

No. 1-253

604



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New Three-Shoe Brake

(Continued from page 74)

that it combines both air and hydraulic fluid actuation as independent functions built into the mechanism and arranged for application either independently or simultaneously at the will of the driver. Consequently, the Fawick system can be employed, as one example, to operate as an air brake for normal service use, and employ hydraulic actuation for emergency stops. Regardless of normal requirements, however, both air and hydraulic applications can be made simultaneously to effect a quick emergency stop. Moreover, the mechanism can be installed on all wheels, including trailer brakes to provide a completely unified braking system for a train.

The central spider, mentioned above, plays a vital role in this arrangement. Not only does it serve as the backbone for the brake assembly, it also houses the brake cylinders and incorporates independent passages for the individual fluid lines to each cylinder for piston actuation.

A claim made for this brake is that its installation will eliminate the need for a separate emergency or parking brake. In fact, special arrangements have been devised to permit locking of wheel brakes on the vehicle or train and even on a trailer while uncoupled.

The brake system is said to operate at considerably lower line pressures, lower than conventional either for hydraulic or air brakes. Fluid pressure is applied on the stepped piston—one line being fed to the face of the small diameter, the other to the annulus on the larger diameter at the upper end. It is of interest that each of the stepped diameters of the brake cylinders has an "O" ring on the outer periphery to provide an effective seal.

From a design standpoint, it is pointed out that each shoe is so articulated as to contact the brake drum completely and with the same uniform pressure. It may be noted that shoe actuation is by means of a lever exerting pressure on the shoe with a multiplication of three to one. Uniform unit pressure on the brake drum results in maintenance of drum concentricity, elimination of high pressure areas, and brake drum distortion.

In addition, it is said that brake adjustment is not at all critical since any reasonable variation in lining thickness is automatically compensated by the free movement of each brake piston.

Although, as mentioned earlier, the Fawick brake is not yet a commercial reality, many features are noted for the fleet operator and vehicle or axle manufacturer. For one thing, the brake system is a self-contained package and can be so designed as to effect interchangeability with any existing brake installation. Another point is that all shoes, levers, pins, etc., are

alike and interchangeable. This means that the standard parts can be assembled on both right and left hand wheels without change.

Moreover, it is planned eventually to supply standard packages for the after market to enable fleet operators to make their own installation.

For military vehicles, off-highway vehicles, and other equipment that is required to operate in water, dirt, mud, etc., Fawick has developed a unique method of sealing which is said to make the brake absolutely dirt-

Test Cabinet

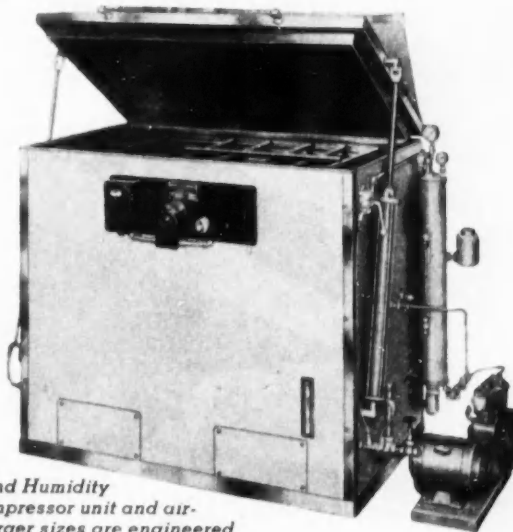
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for Salt Fog Tests Meets the latest specifications of government and military authorities.

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features

- Lucite nozzle
- Built-in heaters
- Fully insulated
- Exhaust flange at rear
- Air-operated cover lifter (extra)



Standard size No. 1
INDUSTRIAL Salt Fog and Humidity
Test Cabinet with air-compressor unit and air-operated cover lifter. Larger sizes are engineered to your requirements.

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Above—Hobbing
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proof and waterproof under the most adverse conditions.

One of the first of the major experimental installations of the Fawick system was made on the enormous Bare amphibious vehicle for the Armed Forces. With its huge 10-ft diameter tires, this vehicle required a 35-in. drum and brake assembly, the brake mechanism being composed of six shoes as shown in Fig. 3.

Oldsmobile Ups Horsepower

(Continued from page 39)

pad mounted over the top of the instrument panel.

Frigidaire air conditioning, offered as optional equipment, has been skillfully designed as an integral part of the car when specified. Its major units are: a condenser mounted ahead of the radiator core; an evaporator mounted in the trunk and housed on the shelf; and a rotary type compressor. In addition to the major elements of the system, the installation includes a receiver, solenoid valve, expansion valve and dehydrator. Capacity of the equipment is about two tons of refrigeration at 50 mph.

A schematic illustration of the air conditioning system appeared in the news section of **AUTOMOTIVE INDUSTRIES**, January 1.

Outside fresh air is drawn into the system through intake air scoops mounted on both sides of the body. A unique feature is found in the adoption of long distributor ducts, mounted along both sides near the roof panel. Cool air is forced into the compartment through a series of many small holes in the ducts. A single three-position switch on the instrument panel controls the operation of the air conditioning system, providing for "off," "cool," and "cold." Individual motorized blowers are supplied for each outlet duct.

Hollingshead Forms New Subsidiary

R. M. Hollingshead Corp. has created a new wholly owned subsidiary at Minneapolis, Minn., to be called Perry Co. The new unit will produce the Perry cooling system for engines. M. M. Perry, previously executive vice-president of Spark-O-Liner Corp., has been named president and general manager of the subsidiary.

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of friction materials**

Products using friction materials are big-volume business at Moraine. Custom-developed friction materials utilizing the powder-metallurgy process and/or other special semi-metallic or non-metallic facings are in active production.

Applications are broad: these materials are in standard use on automotive transmissions such as the Hydra-Matic, Powerglide and Dynaflow. These custom-made materials are also used in tank and truck automatic transmissions. The principles involved have many additional applications in the automotive and household appliance fields, and in the Army, Navy, Air Force and Ordnance materiel.

If your needs meet normal production methods here, and the quantity is sufficient to justify tooling costs, Moraine may be able to help you.



METAL POWDER PARTS BY MORaine

MORaine PRODUCTS
DIVISION OF GENERAL MOTORS • DAYTON, OHIO

Quick Testing for Tool Life

(Continued from page 50)

cylinder into which the Geiger tube may be inserted for gamma counting without coming in contact with the chips. The automatic scaling circuit may be set to count for a predetermined number of counts before it shuts off. The number of predetermined counts chosen is determined by the desired counting accuracy. The normal time required for counting to

a 2½ per cent accuracy is from two to four minutes. The total counts are divided by the counting time to give counts per minute (gross). The background counts per minute (counts per minute recorded by the scaler due to stray radiation only, no source being present) are subtracted from this value to give counts per minute (net). This value, in turn, is divided by the

weight of chips in grams to give the final value of counts per minute per gram of chips (cpm/gm) which is a direct measure of the rate of tool wear.

The experimental test methods and equipment used to date in this investigation, and described above, are by no means the only way of applying radioactive cutting tools to the study of tool wear. There is no reason, for example, why this method would not be just as applicable to a lathe turning operation if proper shielding and other necessary precautions were employed.

The method of tool life testing presented herewith, in order to be of value to the practice of metal cutting, must be more than a rapid method of studying tool wear. It must be applicable to the study of relative tool life when evaluating various cutting fluids, work materials, tool materials and other varying cutting conditions. Data obtained by this method must also be at least as reliable and reproducible as that obtained by accepted methods. The following data are given to establish the validity and applicability of this method and to compare this method with the conventional method of tool life testing.

The results of a series of cuts taken on AISI 8650 steel, starting with a sharp tool, are shown in Fig. 2. Here the total radioactivity of the chips (which is proportional to the amount of radioactive tool material present on the chips), as accumulated throughout the series of cuts, is plotted against tool wear as measured on the flank of the tool with a microscope in the conventional way. It can be seen that the measured radioactivity correlates with the wear measurements made with a microscope. The scattering of the experimental points, evident in this case, is due not nearly as much to variations in the radioactivity measurements as to the "cascading" of the gross wear on the flank (as measured with the microscope). This can be seen by reference to Fig. 1, which is a plot of the actual flank wear data obtained during this same series of cuts. The "cascading" effect evident there is well known and is one of the important factors which often prevent the obtaining of reliable measurements of the rate of tool wear from short time tests, covering only a small portion of the wear curve, when using conventional methods. On the other hand, a plot of the radioactivity of the chips as a function of time, shown in Fig. 3, exhibits (after initial "break-in" of the sharp tool during which wear is very rapid), an essentially linear relationship with practically no cascading. It is evident



Problem: Run engines before installation under varying load and speed conditions—flush and fill with oil—adjust carburetion and timing—determine slippage in automatic transmission.

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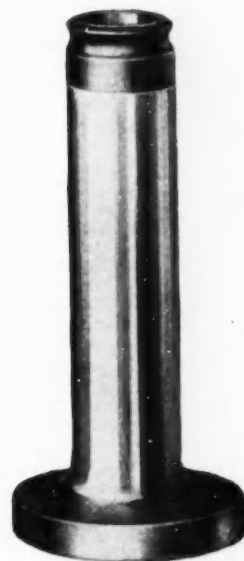
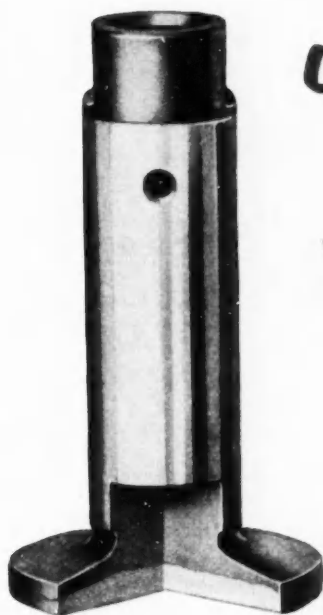
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EATON MANUFACTURING COMPANY

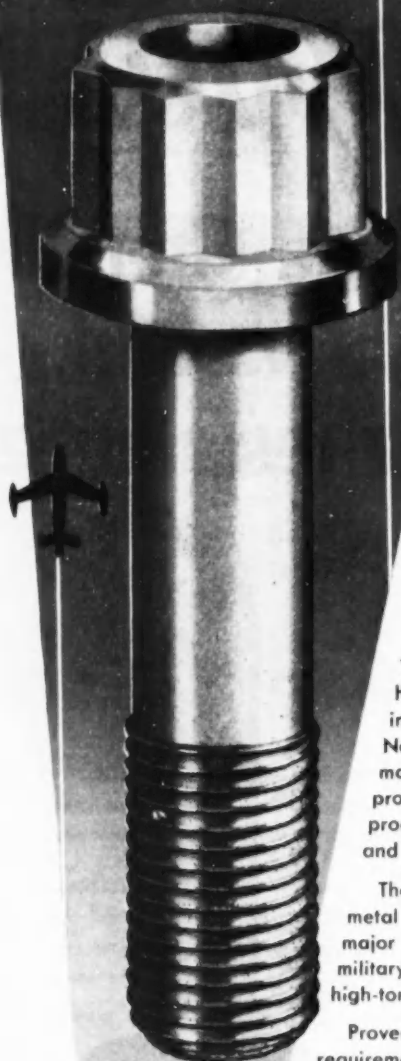
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Proven performance of this type of requirement is your assurance of metal parts quality that meets even the most rigid specifications.

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therefore that the radioactivity of the chips is a valid measure of tool wear. Thus an accurate measure of the rate of tool wear can be obtained by averaging the values for the activity of the chips (cpm/gm. of chips) obtained from only a few runs of a few seconds' duration each.

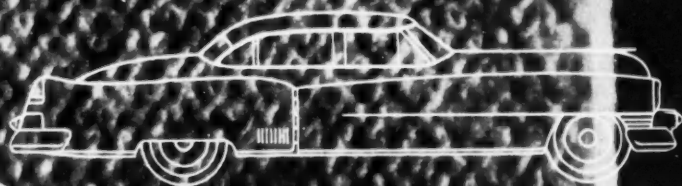
Another study, practically impossible to make by conventional methods, is conveniently made using the tool wear products as a radioactive tracer. Here use is made of the beta radiations to study the relative quantities of tool material worn from the tool face and tool flank. By counting the beta radiation only, the amount of tool wear products on each side of the chip may be counted separately. This is possible because beta particles will not penetrate the chip. Preliminary measurements of this type indicate that the face wear and flank wear are roughly equal.

The above examples are only indications of the usefulness of radioisotopes in wear studies of this type. Through their use the avenues have been opened to a clearer and more complete understanding of the mechanics of the process of tool wear.

BOOKS . . .

STANDARD AIRCRAFT HANDBOOK, by Stuart Leavell and Stanley Bungay, published by Aero Publishers, Inc., 2162 Sunset Blvd., Los Angeles, Calif. Price, \$1.50. Featured in this 160-page pocket handbook is the latest aviation information on standard methods, procedures, materials and parts, as well as hundreds of AN and NAS standards. The volume includes complete chapters on riveting, bolts and fasteners, tools and their proper use, assembly and installation methods, materials and fabricating, blueprint reading, lofting and templates, standard parts and useful reference tables. Twenty-eight major aircraft factories and suppliers throughout the U. S. are said to have collaborated in the publication of the manual.

HOW TO IMPROVE THE UTILIZATION OF ENGINEERING MANPOWER, published by The National Society of Professional Engineers, 1121 Fifteenth Street, N. W., Washington, D. C. Price, \$2.00. This 52-page study pools the experience in utilization of more than 500 leading industrial companies and engineering organizations, employing some 106,000 engineers and a total of 2,750,000 persons. It is the second in a series of research reports based on National Executive Research Surveys conducted by the NSPE through its Professional Engineers Conference Board for Industry. The report points out, for example, that industry could use engineers more effectively by analyzing staff assignments and by standardizing and simplifying many routine engineering jobs that could be done by supporting personnel. Also included is a discussion of the problem of engineering turnover and possible remedial measures.



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Cadillac Horsepower at All-Time High

(Continued from page 38)

required to produce a boost of 20 hp in the basic engine—from 190 to 210—will be of interest since it highlights so well the inherent potentialities of the modern high compression, high performance V-8. First of all, the only change made in the basic engine structure is a different piston, longer in keeping with a change to a compression ratio of 8.25 to 1. The

camshaft too is new with cams of high lift type. Valve size remains unchanged, but increased breathing is achieved by the combination of higher lift and somewhat longer dwell.

The combustion chamber has been redesigned to effect a "thinner" quench area and a change in profile at the spark plug end. The spark plug now is located more centrally and

with a shorter flame travel required.

The four-barrel carburetor is substantially the same as before but is calibrated for leaner mixtures.

According to the engineers, the combination of a more efficient combustion chamber with 8.25 to 1 compression ratio, and adoption of the 12-volt electrical system has teamed up to produce still better fuel economy despite greatly enhanced performance. Moreover, the octane requirement of the engine is said to be lower than it was in 1952, thus making the engine less sensitive to changes in fuel quality.

It is significant that much of the reserve power in the new engine is converted directly into higher fuel economy not only by virtue of engine characteristics but by the adoption of a rear axle ratio of 3.07 to 1 as compared with the former ratio of 3.36 to 1.

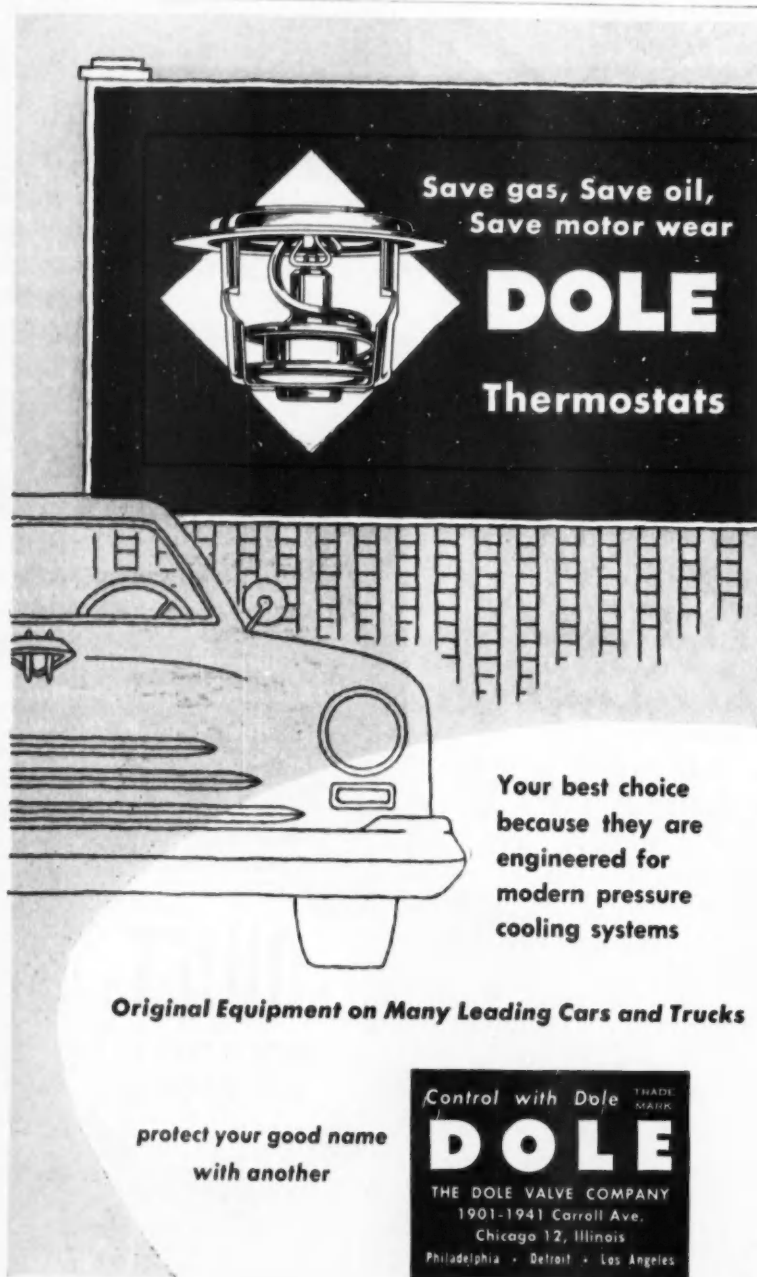
The 12-volt electrical system was introduced primarily to assure adequate firing of the highly compressed mixture under all operating conditions. At the same time this new system boasts plus qualities of major interest. The starting motor provides more than 50 per cent greater cranking speed at zero temperatures, thus improving starting ability. The 12-volt battery is rated 46 per cent higher in capacity, thus providing a reserve for the greatly increased electrical load of a modern car. In addition, the high capacity generator increases wattage by 33 per cent and, consequently, can carry greater loads with adequate reserve for charging the battery.

The new type distributor is capable of handling extremely high voltages without break-down. Ignition wiring is completely waterproofed.

The 12-in. brakes, now standard throughout the line of models, have greater reserve braking capacity but require less foot pressure. Brake drums are ribbed for better cooling and are said to cool rapidly with a minimum of distortion.

The Frigidaire air conditioner consists essentially of a condenser, compressor, evaporator, and two blowers for air circulation. The refrigerant is Freon. Both condenser and compressor are mounted under the hood, the compressor being of cylindrical form driven by the fan belt. The blower and evaporator unit is mounted in

(Turn to page 98, please)



Save gas, Save oil,
Save motor wear

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Thermostats

Your best choice
because they are
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Original Equipment on Many Leading Cars and Trucks

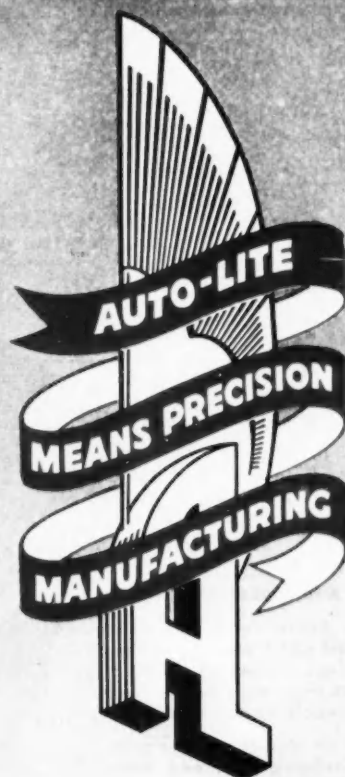
protect your good name
with another

Control with Dole TRADE MARK

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THE DOLE VALVE COMPANY
1901-1941 Carroll Ave.
Chicago 12, Illinois
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You're
always
right
with



AUTO-LITE

AUTO-LITE works to serve the nation's needs in peace and in defense. In 28 great Auto-Lite plants from coast to coast, Auto-Lite produces more than 400 products which are original equipment on many makes of America's finest cars, trucks,

tractors, airplanes and boats. Their 40-year record of dependable performance is summed up in the phrase, "You're Always Right With Auto-Lite."

THE ELECTRIC AUTO-LITE COMPANY
Toledo 1, Ohio Toronto, Ontario

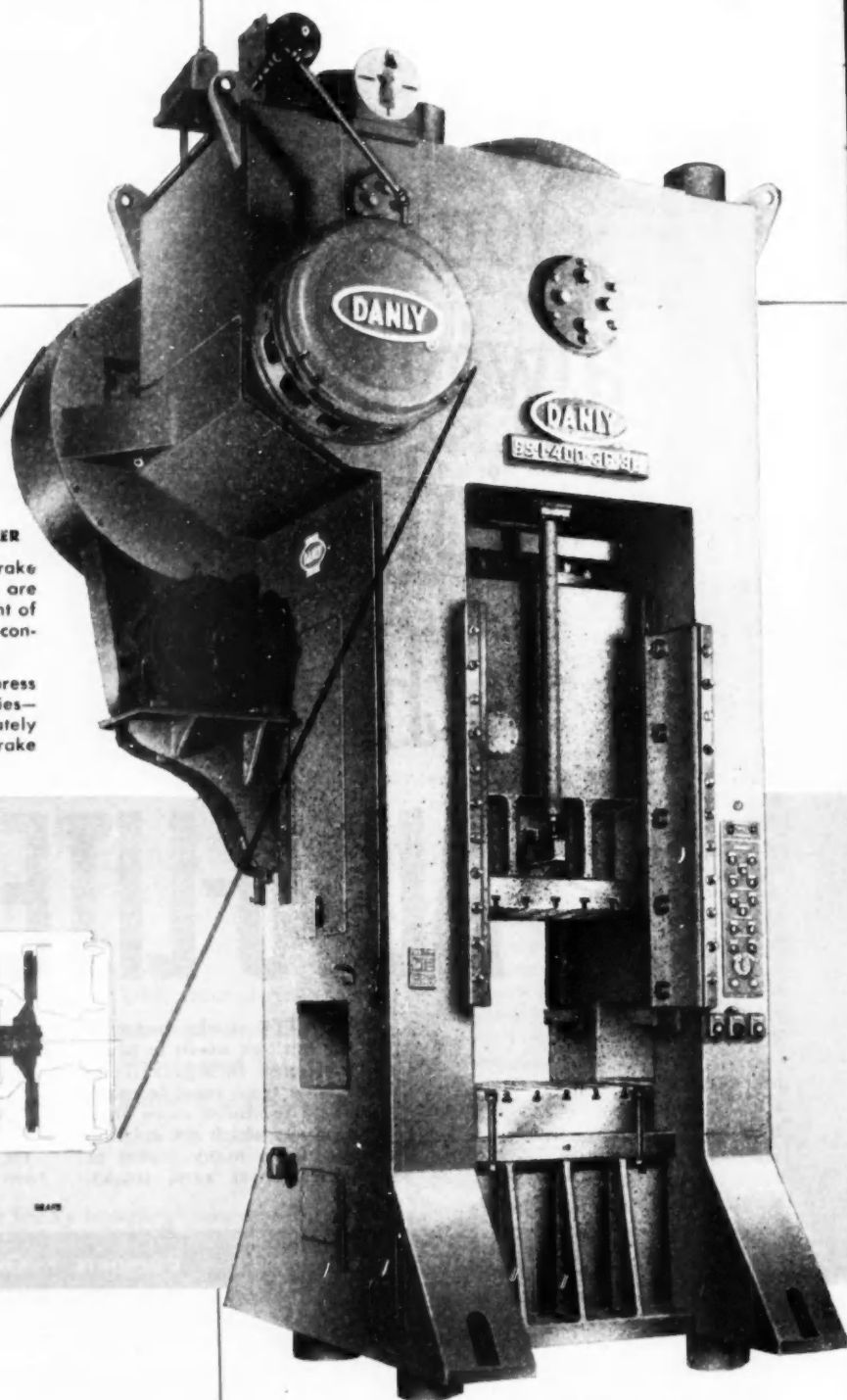
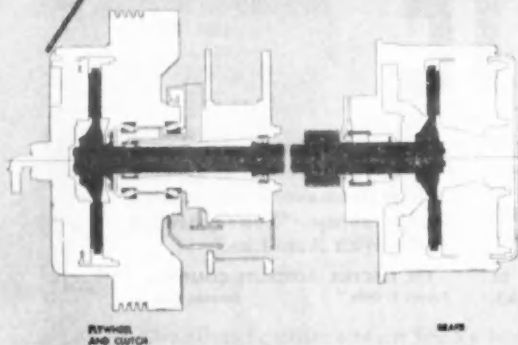
Spark Plugs • Fuel Pumps • Batteries • Bumpers • Generators • Speedometers
Horns • Switches • Moulded Plastics • Speedometer Cable
Starting Motors • Ignition Units • Instruments & Gauges • Windshield Wipers
Lighting Units • Wire & Cable • Gray Iron Castings
Window Lifts • Metal Fabricated Assemblies • Zinc & Aluminum Base Die Castings

when you buy presses...

WHY THE DANLY CLUTCH AND BRAKE RUN COOLER

The rotating parts in a Danly clutch and Brake subject to "pick-up" during clutch engagement are shown in color. Danly design reduces the weight of these parts to only 1/5 as much as those in a conventional clutch of comparable torque rating.

The total energy to pick up all parts of the press subject to acceleration—including slide and dies—during clutch engagement is reduced approximately two-thirds. That's why the Danly Clutch and Brake run cooler and last longer.



A Danly 400 ton Single Action One Point Straight Side Press equipped with the Danly Cool-Running Clutch. Outboard mounting of both clutch and brake permit renewal of friction discs in less than 30 minutes.

take a close look at the drive

Actual production tests show that the new Danly Cool-Running Clutch, an exclusive Danly Press feature, withstands up to 7 times more engagements than a conventional press clutch before it is necessary to make adjustment for lining wear. The resulting reduction in maintenance and press down time for clutch take-up, an important factor in press operating costs, accounts for outstanding savings.

Features like this—together with automatic lubrication and extra rigid precision construction—are the reason why time and cost conscious production men specify . . .

DANLY PRESSES

Danly's complete engineering staff is at your service to help you select the best presses for your job. Write today—and ask for the Danly Straight Side Press Catalog.



DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

It costs less to run a DANLY PRESS!



Single Action
Straight Side



Autofeed



Underdrive
Single, Double,
Triple Action



Gap Frame



Double Action
Straight Side

**CHART SHOWING EFFECT OF TEMPERATURE
ON RATE OF CLUTCH WEAR.**

WEAR

TEMPERATURE

**ZONE OF
DISINTEGRATION**

WHY DANLY FRICTION DISCS LAST UP TO 7 TIMES LONGER

Chart shows how heat causes disintegration of lining in a press clutch. The steep slope in the curve shows how wear rapidly increases with temperatures.

The cool running Danly clutch generates less heat and the small amount generated is rapidly carried off by a continuous blast of forced air.

Normal operation of a Danly Cool Running Clutch is only 35° above room temperature!



MECHANICAL PRESSES . . . 50 TO 3000 TONS

HYDRAULIC METALWORKING EQUIPMENT

Yours for REDUCED FIRE LOSSES CARDOX Experience

The Priceless "EXTRA"

You Don't Pay for in

CARDOX

Low Pressure Carbon Dioxide
Fire Extinguishing Systems*



EXPERIENCE is the one thing that can't be copied.

CARDOX originated and created Low Pressure Carbon Dioxide Fire Extinguishing Systems many years ago.

Since then CARDOX has installed thousands of successful Systems — has held steadfastly to its never-ending research and engineering program for the continuous betterment of CARDOX fire protection.

As a result, CARDOX' experience and knowledge of low pressure carbon dioxide and its application are unapproached—literally years ahead.

This is the priceless "extra" that comes to you with every CARDOX System.

Approved by:
Underwriters'
Laboratories, Inc.
Manual Systems—1940
Automatic Systems—1941

Factory Mutual
Laboratories
Manual Systems—1942
Automatic Systems—1942

First Installation—1939
Thousands of Systems
since, for most of the
nation's leading corpora-
tions and industries.

* Covered by U. S. and
foreign patents, issued
and pending.

CARDOX CORPORATION

BELL BUILDING • CHICAGO 1, ILLINOIS • District Offices in Principal Cities

Cadillac Horsepower

(Continued from page 94)

the luggage compartment, occupying the space on the shelf below the rear package shelf.

Cadillac offers two different types of Frigidaire installations. For temperature climate, cool air is arranged to issue from grilles on the rear package shelf. For operating in extremely hot climates, the system is arranged to discharge cool air from ducts running along the headlining. Fresh outside air is directed into the system from sports styled air intake scoops mounted on the outside of the body.

A dual heater-ventilation system is an innovation for 1953. It consists of two units—a heater-defroster, and an underseat heater. The combination heater-defroster behind the instrument panel provides fresh air, heated or unheated, to the front compartment. The underseat heater delivers all of its output to the rear compartment. The combination unit is the largest ever used by Cadillac.

Special controls have been designed to provide fresh air at any desired temperature through thermostatic control, using a group of four knobs for the purpose. On the big Series 75 cars two underseat heaters are installed beneath the rear seat to assure comfort, replacing the front underseat heater.

The Eldorado is a luxurious convertible model mounted on a chassis that is one in. lower than standard with body sheet metal lowered to provide the low sleek profile. The convertible top — available in white or black Orlon—folds automatically into the rear deck compartment and is concealed under a metal cover. At the touch of a button the metal cover automatically rises to permit the top to raise into position, the operation being repeated in reverse when the top is to be lowered.

Price of new Cadillac models remains the same as in 1952. Cost of power steering has been reduced by \$21.45.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of
Automotive and Aviation

MANUFACTURING

Men who depend on power...know
they can depend on

CUMMINS



CUMMINS DIESELS are engineered
to make light work of tough jobs

Progressive, eyes-ahead engineering is one of the big reasons why so many truckers pick Cummins Diesels for dependability.

Consider Cummins' exclusive system of fuel injection and metering—an important factor in the unequalled performance records established by lightweight, high-speed (60-600 h.p.) Cummins Diesels. No other Diesel fuel system is *so simple . . . so rugged!* It delivers a uniform, properly prepared fuel charge to every cylinder. All under low pressure.

Your Cummins dealer will be glad to tell you about the many engineering advantages built into every Cummins Diesel. He is an expert who knows the requirements of your job. He heads up a specialized parts and service organization—equipped to handle all your diesel power needs. Call him today . . . or write!

**Leaders in rugged, lightweight,
high-speed diesel power!**

CUMMINS

TRADEMARK REG. U. S. PAT. OFF. PENDING

CUMMINS ENGINE COMPANY, INC., Columbus, Ind. • Export: Cummins Diesel Export Corp., Columbus, Ind., U.S.A. • Cable: CUMDIE

The HORSEPOWER RACE

(Continued from page 37)

quality may remain at 1952 levels, rather than improve, it is obvious that combustion chamber design and other elements contributing to mechanical octanes have been vastly improved, even though the changes do not appear to be outstanding on the surface.

It may be noted in passing that

with the emergence of the new crop of high performance engines, the factor of bhp/cu in., up to now a rather firm yardstick, has become as fluid as quicksand and no longer means as much except in rating the offerings of a given model year.

It is significant that relatively small changes—all above the basic block—serve to effect really big increases in output. Generally, these include changes in the combustion chamber, installation of four-barrel carburetors, increased breathing capacity through increase in valve size and port diam-

eters, and in some instances a shift to twin exhaust systems.

If and when the surge to higher ratings has run its course, the same engines may be modified to extract gains in the form of increased fuel economy rather than greater horsepower. True enough, some of the new engines show gains in specific fuel economy with the changes made to increase output. This does not necessarily mean, however, that gas tank or pocketbook mileage will be better than before.

The trends, mentioned briefly above, confirm the earlier promise that the new type of engine will have an unusually long useful life insofar as major elements are concerned, thus making it possible to amortize the enormous costs involved in engineering and development, and in the cost of tooling and transfer machine equipment. These considerations amply justify the current trends to automatic machine lines and automatic materials handling.

Another hint of an industry-wide trend, as sweeping as the V-8's and equally dictated by new engine designs, is the introduction of 12-volt electrical systems. Oldsmobile, Cadillac, Buick, and Chrysler Crown Imperials have announced adoption of the 12-volt system for 1953. Judging by what we hear, it is only a matter of time before this trend will be extended to still other makes. As described in AUTOMOTIVE INDUSTRIES, November 1, 1952, a major objective of the 12-volt system is to supply adequate secondary voltage to the spark plugs to initiate positive and effective ignition in a highly compressed atmosphere. Equally important is the availability of increased wattage to satisfy the constantly growing electrical demand, and increased cranking ability. Depending upon specific conditions, the 12-volt system also promises important savings in copper, although the full benefits of such savings can be realized only when a majority of makes have joined the parade.

The table on page 37 shows that the rating—bhp/cu in.—for the moment has been completely realigned with Lincoln in Number One place by virtue of its rating of 0.646. Cadillac occupies second place, while De Soto, which led last year, is now in fifth place. The new Buick Roadmaster engine takes third place.

With the inclusion of a sufficient number of new engines, we have elected to drop the listing of conventional engines having a rating below 0.500, although three such makes were listed last year.

**COST...
COMPACTNESS...
PERFORMANCE...**
All Often Improved with...

Lamb Electric

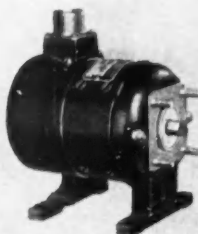
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS

• You may find, as have many other designers of motor-driven products, that the use of a special application Lamb Electric Motor will enable you to reduce costs.

Compactness... low weight... excellent performance—these are some of the other advantages obtained with Lamb Electric Motors, because they are *specially engineered* for the application.

The Lamb Electric Company
Kent, Ohio

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Intermittent high torque motor with low weight factor; for aircraft and many other applications.



Space factor in this power unit is minimized by having output shaft at right angles to motor shaft.

**THEY'RE POWERING
AMERICA'S *Finest* PRODUCTS**

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER **MOTORS**



Autocar

another famous name that depends on

THOMPSON VALVES

Big trucks or middle-size, over-the-road or off-the-highway . . . if they are powered by Autocar engines, they use Thompson valves.

Autocar engineers give Thompson engineers the engine service requirements, rely on Thompson for design, engineering, and production of valves that will help maintain the Autocar reputation for economy and long life.

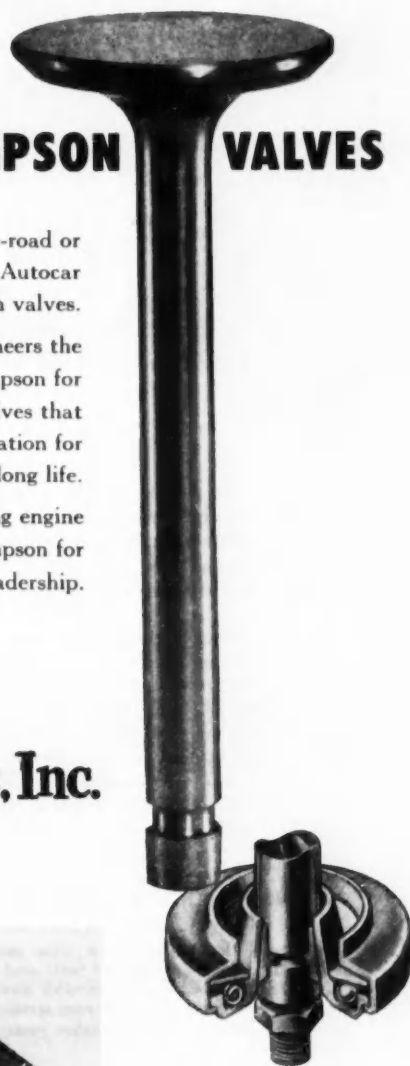
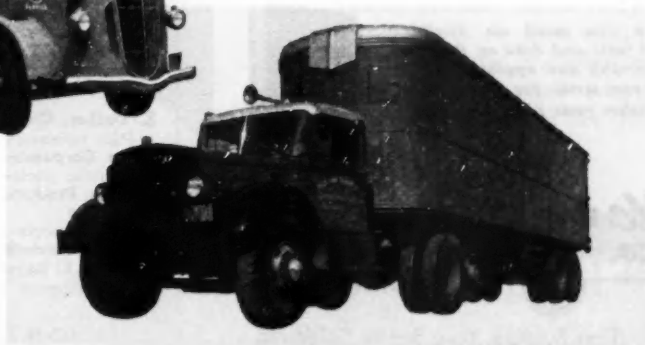
Take a tip from Autocar and other leading engine builders . . . count on Thompson for engineering leadership.



VALVE DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO



Thompson-developed "Rotacaps" help add thousands of miles to valve life.



The success of a flexible shaft application depends on getting the right shaft for the job. This means a shaft that not only has the desired characteristics, but one that you can count on for completely dependable service, smooth trouble-free operation and long service life.

You get exactly this when you specify S.S. WHITE flexible shafts. These shafts are the product of over 70 years specialized engineering, manufacturing and application experience. They're made of special grades of wire and wound on specially developed machines to conform to exacting and unvarying quality standards. Each and every foot supplied measures up to known specifications and characteristics. With an S.S. WHITE flexible shaft you know exactly what you are getting, how it will perform, and what it can and cannot do. So, for flexible shafts, specify S.S. White.

SEND FOR THIS NEW 256-PAGE FLEXIBLE SHAFT HANDBOOK

Here's all the information you need on flexible shafts. It contains complete facts and data on flexible shaft construction, characteristics and application. A copy will be sent free, if you write for it on your business letterhead and mention your position.



THE S.S. White INDUSTRIAL DIVISION
DENTAL MFG. CO.



Dept. B, 10 East 40th St.
 NEW YORK 16, N. Y.

Western District Office • Times Building, Long Beach, California

More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from November 26 to December 19, 1952. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

— A —

Aerol Co., Inc., Los Angeles, Calif.
 Wheel assy.—Various—\$99,739

Aeroproducts, Allison Div. General Motors Corp., Dayton, Ohio
 Maintenance parts—Various—\$37,613
 Actuator assy.—Various—\$142,148

Airesearch Mfg. Co., Div. of The Garrett Corp., Los Angeles, Calif.
 Valve and thermostat—Various—\$64,928

Allison Division, General Motors Corp., Indianapolis, Indiana
 Turbo jet engines—105 ea—\$2,055,000
 Turbo jet engines—109 ea—\$582,000

— B —

The B. G. Corp., New York, N. Y.
 Ignitor plug assy.—5,488 ea—\$47,197

Beech Aircraft Corp., Wichita, Kansas
 Spare parts—\$100,000

Bendix Products Div., Bendix Aviation Corp., S. Bend, Indiana
 Wheel assemblies—102—\$68,226
 Maintenance parts—Various—\$67,793

Bowen-McLaughlin-York, Inc., York, Pa.
 Wrecker—123—\$569,089
 Wrecker—200—\$655,494

Bridgeport-Lycoming Div., AVCO Mfg. Corp., Stratford, Conn.
 Engines—\$800,000
 Aircraft engines—\$10,506,785

— C —

Champion Spark Plug Co., Toledo, Ohio
 Spark plugs—34,560 ea—\$67,750
 Spark plug—51,000 ea—\$65,739

Chase Brass & Copper Company, Inc., Waterbury, Conn.
 Hardware—667,595—\$223,989

Chrysler Corporation, Detroit, Michigan
 Replacement parts for pilots T43 and T48—\$100,474

— D —

E. Daiber, Cleveland, Ohio
 Pilot tubes—2293 ea—\$38,522

Dana Corporation, Toledo, Ohio
 Vehicle parts—850—\$61,643

DeLuxe Products Corp., La Porte, Indiana
 Spare parts—Various—\$94,631

Douglas Aircraft Co., Inc., El Segundo Div., El Segundo, Calif.
 Maintenance parts—Various—\$130,392

(Turn to page 105, please)



*Typical of hundreds
of applications*

where

SuVeneer[®] clad metals

are being used successfully today

Wherever the advantages of solid copper or brass *surfaces* are required, product designers and manufacturers are finding *new economy* and complete adaptability in **SuVeneer** Clad Metals . . . *solid* copper or brass, bonded inseparably to one or both sides of plain strip steel. **SuVeneer** Clad Metals are furnished in easy-handling coils—in the gauges and widths you need. Write for descriptive Bulletin.

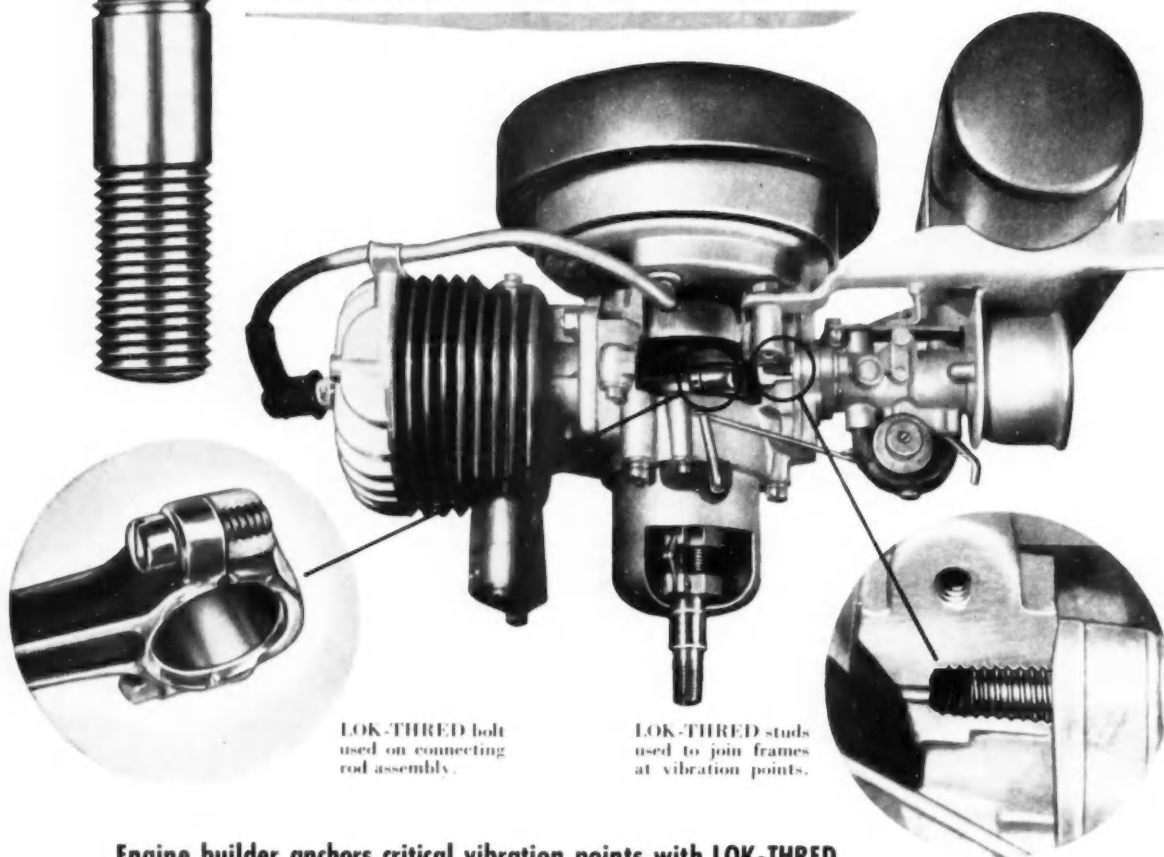
Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA

LOK-THRED

can't shake loose



LOK-THRED bolt used on connecting rod assembly.

LOK-THRED studs used to join frames at vibration points.

Engine builder anchors critical vibration points with LOK-THRED

By utilizing LOK-THRED'S extra strength and more positive locking action, manufacturers are finding *better* answers to many vibration-fastening problems.

For example, in this lightweight, air-cooled gasoline engine, manufactured by Power Products Corp., the cylinder and carburetor assemblies are held in place by LOK-THRED studs, anchored as shown in the cutaway view at right. Subject to vibration through the life of the engine, these studs provide extra strength in both tension and torsion ... *actually become tighter in service.*

LOK-THRED bolts are used to provide positive locking on the connecting-rod assembly.

LOK-THRED may provide the better fastening method you've been looking for. Write today for LOK-THRED booklet, giving full information and technical details.

Motor with cut-out sections illustrating LOK-THRED applications, courtesy Power Products Corp., Grafton, Wisc.



THE NATIONAL SCREW & MFG. COMPANY Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.



FASTENERS



HODELL CHAINS



CHESTER HOISTS



(Continued from page 103)

— E —

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Bearing—Various—\$79.271
Vehicle parts—2050—\$47.499
Thomas Edison, Inc., West Orange, N. J.
Kits—968 ea—\$1,161,820
351 ea
434 ea

— F —

Fletcher Aviation Corp., Pasadena, Calif.
Kit—11,870—\$594,847
Cylinder—3000 ea
Plunger—4000 ea

— G —

GMC, Truck & Coach Div., General Motors Corp., Pontiac, Michigan
Truck and tractor—491—\$1,519,510
The B. F. Goodrich Co., Dayton, Ohio
Wheel assemblies—189 ea—\$298,847
Wheel assemblies—240 ea
Brake assemblies—480 ea
Wheel assemblies—3538 ea—\$329,091
Brake assemblies—5123 ea
The Goodyear Tire & Rubber Co., Inc., Akron, Ohio
Maintenance parts—Various—\$56,222
Wheel assy.—Various—\$33,287
Gray-Marine Motor Co., Detroit, Mich.
Spare parts—Various—\$52,284
General Electric Co., Phila., Pa.
Instruments—Various—\$38,302

— H —

Harnischfeger Corp., Milwaukee, Wisconsin
Spare parts—Various—\$38,374
Hydro-Aire, Inc., Subsidiary of Crane Co., Burbank, California
Filter assembly—Various—\$69,067
Valve, fuel selector—330 ea—\$55,341

— I —

Industrial Supply Co., Detroit, Mich.
Hardware—1,566,000—\$29,289
International Harvester Co., Washington, D. C.
Truck and wrecker—11—\$63,098
International Harvester Co., Industrial Power Div., Melrose Park, Illinois
Spare parts—Various—\$237,062

— K —

Koehring Company, Milwaukee, Wisconsin
Spare parts—Various—\$29,605
Kollsman Instrument Corp., Elmhurst, N. Y.
Indicator—2000 ea—\$192,360

— L —

The Lamson & Sessions Co., Cleveland, Ohio
Hardware—2,135,000—\$57,252
Lycoming-Spencer Div., AVCO Mfg. Corp., Williamsport, Pa.
Engine—35 ea—\$51,233
Spare parts—1 lot

— M —

Marlin-Rockwell Co., Jamestown, N. Y.
Hardware—3000—\$25,140

Michigan Bolt & Nut, Detroit, Mich.
Hardware—1,010,000—\$32,802

— N —

National Mach. Co., Utical, Mich.
Hardware—3,050,000—\$26,836

— P —

Propeller Division, Curtiss-Wright Corp., Caldwell, N. J.
Propeller assemblies—13—\$318,381

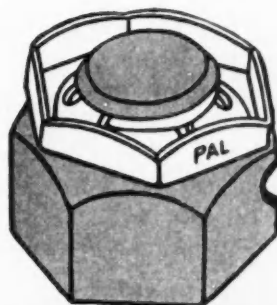
— S —

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.
Ignition spare parts—Various—\$205,629

Spare parts—Various—\$69,547
Vehicle parts—2300—\$81,420
Simmonds Aerocessories, Inc., Tarrytown, N. Y.
Various assys.—Various—\$31,138
Solar Aircraft Co., San Diego, Calif.
Stack assys—Various—\$281,060
Stover Lock-Nut & Machinery, Easton, Pa.
Hardware—5,860,000—\$66,444

— U —

United Aircraft Corp., Hamilton Standard Div., E. Hartford, Conn.
Maintenance—Various—\$192,440
Parts—Various—\$458,741
Maintenance parts—Various—\$33,378



THIS NUT
WILL STAY
TIGHT..

...because it's locked
with a

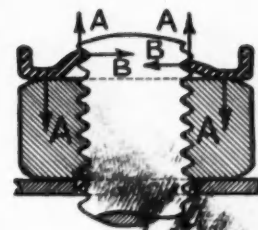
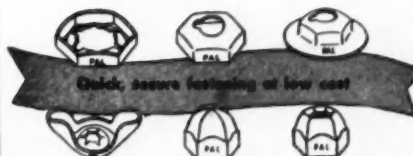
PALNUT
LOCK NUT



With an ordinary nut carrying the load, and a Regular Type PALNUT to keep it tight—you have a powerful fastening team that licks severest vibration. PALNUTS provide absolute security wherever bolt-and-nut assemblies must stay tight—on structural members or engine parts. Low in cost, light in weight, require small space, assemble speedily with hand or power drivers.

AUTOMOTIVE USES: Connecting rods, main bearings, engine mountings, brake parts, body hold down, shock absorber mounting, transmission housings, etc. Send for free samples and Bulletin #577.

The PALNUT Co., 60 Cordier St., Irvington 11, N. J.
Detroit: 730 West Eight Mile Road



DOUBLE LOCKING ACTION

Powerful spring tension (A-A) is exerted upward on the bolt threads and downward on the ordinary nut, while slotted jaws (B-B) close in and grip the bolt like a chuck.

PALNUT
LOCK NUTS



Stacking a stabilized load of weather-protected cans at United Can & Glass Co., Hayward, Calif.

Use your air rights...

on pier, in plant, outside or warehouse-wide... let Towmotor stack space-eating loads, up where you've storage capacity to spare. Speeding the handling of *all* materials, Towmotor saves its cost in a matter of months—then *you* profit by that big earning power throughout many busy years. You'll see the proof, right from the start, in stepped-up output per man-hour. Chart your course for maximum production with the help of a copy of "Man-Hour Thieves." Write for yours *now* and name of your nearest Towmotor Representative. Towmotor Corporation, Div. 4501, 1226 E. 152nd St., Cleveland 10, Ohio.



FORK LIFT TRUCKS and TRACTORS

SINCE 1919

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

United Aircraft Corp., Pratt & Whitney
Aircraft Div., East Hartford, Conn.
Maintenance parts—Various—\$1,329,-
500
Maintenance parts—Various—\$4,665,-
261
Spare parts—Various—\$29,648
Maintenance parts—1000 ea—\$254,520
Spare parts—Various—\$322,586
Support assembly—266 ea—\$30,901
United Aircraft Products, Inc., Dayton,
Ohio
Valve assy; oil—Various—\$26,111

— V —

Vickers, Inc., Detroit, Michigan
Hydraulic motor assembly—547 ea—
\$184,989
Maintenance parts—Various—\$218,-
111
Pump—357 ea—\$196,673

— W —

Western Gear Works, Lynwood, Cali-
fornia
Actuator—177 ea—\$202,881
White Motor Company, Cleveland, Ohio
Vehicle parts—156—\$61,019

BOOKS...

ECONOMIC FORCES IN AMERICAN HISTORY, by George Soule, published by the Dryden Press, 31 W. 54th St., New York 19, N. Y. Price, \$4.75. The history of the U. S. or any other country, for that matter, cannot be strictly defined as being economic, psychological, political, sociological, etc., for it is of necessity a potpourri of all these and other diverse elements. It is possible, however, to extract for study from a vast panorama of varied experience those events which appear to be markedly economic in nature, in short those which indicate how men have earned their livelihoods and sought wealth. This 550-page volume pinpoints events in the American economy of the past in order to show in clearer focus our present-day economic setup. Considerably more space is devoted in the book to the last 50 years than to those which preceded it, not only because the author aims to analyze more carefully the last half-century, but also because the economic process has increased in complexity to a notable extent during recent years. Part I, which covers the period before 1900, scrutinizes the economic threads woven through the pattern of pre-colonial and colonial days, the American and Industrial Revolutions, the steady growth of the nation in land, farming, transportation, financial wealth, etc., and the adjustments made before, during, and after the Civil War period. Part II, which surveys the years after 1900, highlights the enormous surge of technology and production, the changing shape of the economy, the shifting scene during and after War I, the Roaring Twenties, the Great Depression and the New Deal, World War II, and the last few years. The book is profusely illustrated with graphs, maps, and tables. It is strongly recommended as a comprehensive guide to an understanding of the economic currents which have run through the rise of the U. S. from a humble group of small colonies to the industrial giant it is today.

JOHNSON SLEEVE BEARINGS

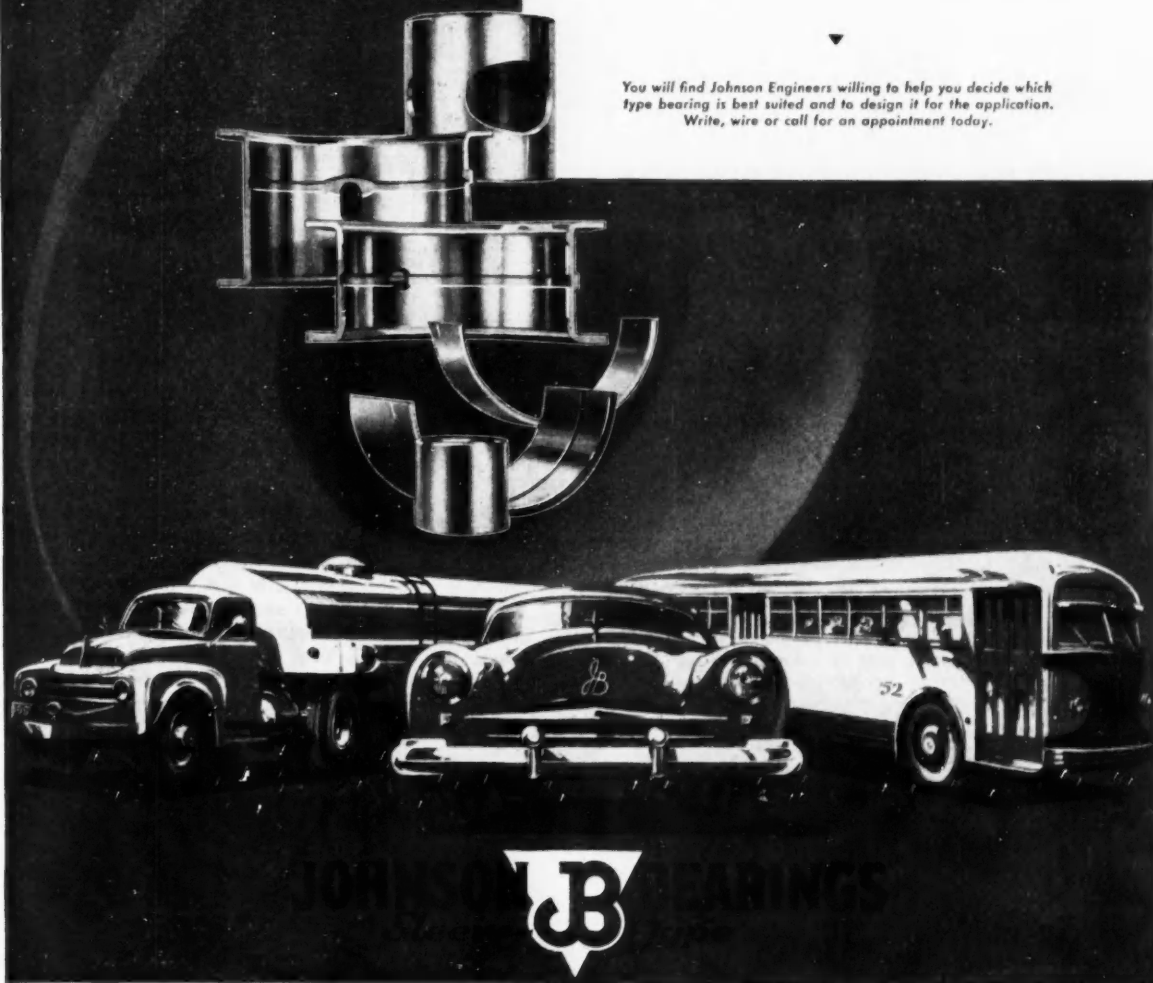
Travel in distinguished company

NO GREATER TRIBUTE can be paid Johnson Bearings than the reputations for performance of the cars, trucks, buses, diesel engines and other motive equipment in which they are installed. The list reads like the "Who's Who" of the industry. This reputation for quality is well earned, as Johnson Bronze is equipped to produce every type of sleeve bearings, cast bronze, aluminum alloy,

bronze-on-steel, sheet bronze, babbitted, graphited, and molded bearings from powdered bronze. No matter what your requirements, you can depend on "Sleeve Bearing Headquarters."

JOHNSON BRONZE COMPANY
625 So. Mill Street • New Castle, Pa.

You will find Johnson Engineers willing to help you decide which type bearing is best suited and to design it for the application. Write, wire or call for an appointment today.



AIRBRIEFS

(Continued from page 72)

desires or it will not likely be sold; the graveyard is replete with projects which did not."

American Airlines clearly has no intention of being stampeded into buying jet transports until it makes sound economic sense, and Littlewood undoubtedly speaks for his fellow airline engineers. Meanwhile, they are all buying more Douglas DC-7's,

Lockheed Super Constellations and Convair Liners!

Time for Merger

The new Republican administration will have its hands full with the perennial unification problem within the Department of Defense. Following the elections last November, the outgoing administrative echelons of the three services took the wraps off their smoldering battles and aired them in public. Undersecretary of the Air Force Gilpatric boldly shouted: "Du-

plications could be avoided and money saved if one uniform air force were established to replace the four (USAF, Navy, Army and Marine Corps) now in operation." This inflammatory statement was only symptomatic of the undercover battle that has gone on in the Pentagon for the past four years. The most reasoned statement issued on the subject in the past two weeks was that by Navy Secretary Dan Kimball: "The airplane is a weapon, not a way of life. As a weapon, each of the services has certain functions and operations where airplanes are necessary. We must use them as they are suited for the problem. It would be just as ridiculous to say that only one of the services could use guns, or trucks, or any of the other millions of items that each and all of the services need."

What Happens When and If

Neither the aircraft nor the automobile industries will ever forget V-J Day contract cancellations and the complete collapse of war production. Since Korea, both industries have proceeded cautiously in their expansion with a hard eye on the possibilities of a future peace and its consequences. First official word on Air Force thinking on such matters comes from USAF Undersecretary Roswell Gilpatric, who proposes three policies.

Firstly, the airframe industry can be kept fully occupied for many years with modification work on current production aircraft. Electronic progress is so rapid that equipment is often radically changed between the time a combat airplane starts down the line and when it rolls from the factory. Currently, virtually all combat aircraft are being flown from the factory to a modification center. A future recession of production would permit the industry to make these modifications in its own plants. The aircraft engine industry can be kept busy for several years overhauling engines it is now delivering since the USAF's own overhaul shops are filled to overflowing and contract overhaul facilities are already jammed.

The problem in the automobile and home appliance industries is more readily solved, of course, but Gilpatric strongly favors the "dual plant" theory originally advanced in construction of the General Motors factory at Arlington, Tex., in which airplanes were to be built in one portion and automobiles assembled in the remainder, the ratio between the two being readily varied. Gilpatric wants such companies to keep the air-

(Turn to page 112, please)



AIRCRAFT
GENERATOR
TESTER
SUN model AGT-2

Especially designed to comply with United States Air Force Specification MIL-S-7223, this unit will test 28-volt aircraft and similar DC generators with output capacities up to 600 Amperes and speed ranges from 2000 to 11,600 RPM.

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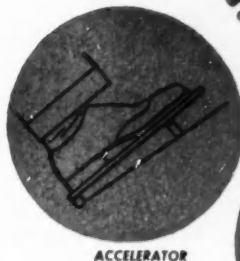
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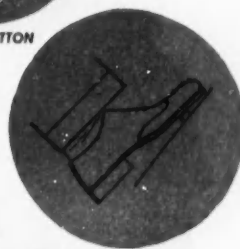
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Few products have ever won the overwhelming approval accorded the Bendix* Starter Drive. In automotive vehicles of all types, in the marine field, in stationary engines and aircraft, in fact wherever motors start, more than eighty-five million Bendix Drives have established an unrivaled record for dependable performance. Perhaps even more remarkable is the fact that in most installations manufacturers have paid less for the Bendix Drive than for other types. This unique combination of dependable performance and low cost is made possible by Bendix exclusive design features. For example, the Bendix Starter Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result—starting motor can be mounted more easily and in more positions. Also the Bendix Drive has fewer parts and needs no adjustments. If you want true economy, plus performance proven by over 85,000,000 installations, be sure to specify Bendix Starter Drives. Your inquiry will receive immediate attention.

*REG. U.S. PAT. OFF.

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WHAT ***Life-Line*** REALLY DELIVERS IS MORE SERVICE... LESS SERVICING

See how the maintenance has been engineered out with modern *Life-Lines*

Forget your previous ideas of motor and control maintenance. The advanced design of Life-Line motors and Life-Linestarters sets new lows in maintenance. Excessive maintenance has been engineered out—in advance.

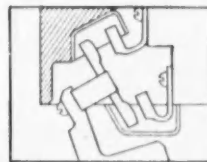
Take the Life-Linestarter for example: There are fewer moving parts. Operation is simple. No complex linkage in contact closing arrangement. No sliding surfaces. No hinge pins. Contacts, too, are protected by the exclusive deionizing principle of arc extinction—the most efficient method devised. Contact burning is minimized—contact maintenance engineered out!

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Summed up—what is really engineered and built into Life-Lines is simply—more service on the job—less servicing, and down time. Ask your Westinghouse representative to show you proof that Life-Line motors and Life-Linestarters are the equipment built to match the high productivity requirements of today's industry. A call to your local office will bring you fast service, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

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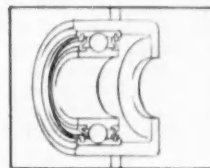
YOU CAN BE SURE... IF IT'S
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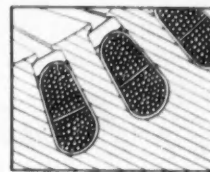
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Never Jams. No sliding surfaces to wear—no sticking—no jamming—nothing to wear or replace.



MOTOR Needs No Lubrication. Pre-lubricated factory-sealed bearings eliminate troubles due to over or under lubrication, dust and dirt.



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AIRBRIEFS

(Continued from page 108)

craft tool line intact for a possible future emergency and not scrapped altogether. Thus, this time the Air Force is making definite plans to "soften the blow" but there are few who foresee such a necessity for many years to come.

Machine Tools

Studebaker Chairman Harold S. Vance, in his capacity as head of the ODM Advisory Committee on Production Equipment, has completed a plan for Government buying and storing of adequate machine tools to handle the production assignment of a future emergency. The first phase of the program will be submitted to the new Congress, which will be asked for a "down payment" to get the program rolling. The Vance Committee, noting "a sense of great urgency" and existing "major deficiencies in production capacity," asked the services to use whatever fiscal '52 and '53 funds are available for the purpose and to include a substantial sum in their '54 fiscal year budgets for the purpose. The Committee also fully endorsed the USAF and Navy Production Acceleration Insurance Program and the USAF's \$389 million heavy press program. This theory is, of course, quite sound for the automobile and the aircraft engine builders but the aircraft manufacturing industry has the peculiar problem of very low volume and very rapid design changes to deal with which makes realization of such a program difficult.

The Vance Committee urges such an expansion be undertaken by private funds wherever possible but recommends Government funds when the projects are in the national interest, thereby encompassing the whole of the aircraft industry. The industry now has contracts for as few as 100 airplanes in some instances and in no case does the volume extend for more than 1000 identical airplanes. It is extremely difficult to justify an elaborate tooling setup to make 1000 parts, and impossible to justify for 100 parts. Thus, the present tooling difficulty of the aircraft industry lies largely at the door of small volume and not, to any great extent, on an inability to obtain the machine tools. Here is the root tooling problem that must be solved, and the Vance Committee report takes a sound step in this direction by suggesting, in effect,

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• Leading manufacturers find that Cleveland press design and construction pays big production dividends. All gears and drive units of the Cleveland Two-Point Press shown here are enclosed within the crown. This elimination of outboard brackets provides greater operator safety...makes the press frame more rigid for lasting accuracy. This modern construction makes it convenient to load and unload dies.

For utmost precision, this press is equipped with a Cleveland (patented) electrically controlled, air operated, drum-type friction clutch with spring loaded brake. Instantaneous in action, it gives the operator positive control at any point of the stroke. This lightweight clutch has few moving parts. Requiring minimum maintenance, it reduces press down-time and uses less power for operation.

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FABRICATING TOOLS

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that the industry tool up to produce 10,000 parts even though the current order is for only 300 such parts. This "over-tooling" cost must, of course, be borne by the Government and it is precisely in this fiscal impasse that the new Congress will find itself—and at a time when it is economy-bent.

More Stretching

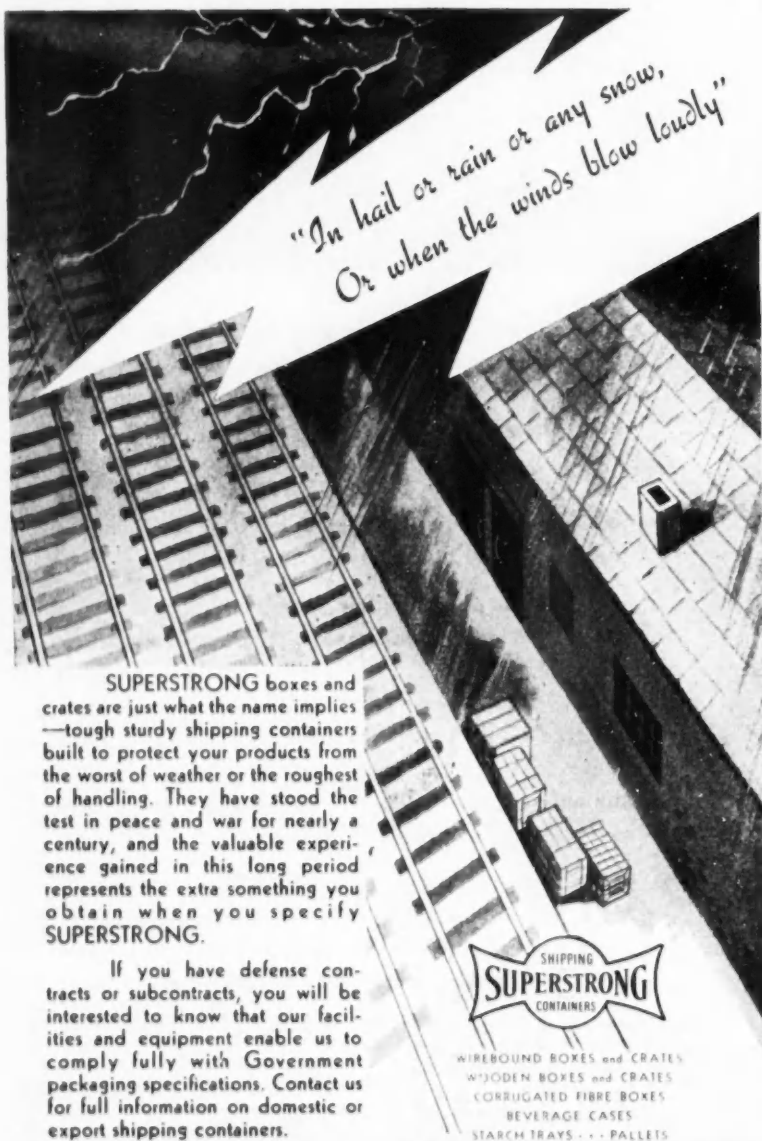
Meanwhile, the USAF has cut back Lockheed F-94C production by 35 per cent, and the Navy has reduced production on the North American FJ-2 by 33 per cent, on the Douglas AD-5

by 13 per cent, and on the Grumman F9F-6 by 18 per cent. It is this constant plea for expanded tooling and acceleration of output, in tune with equally decisive moves to cut production, that keeps the aircraft industry in a constant state of perplexity and frustration. After groping for the answer, the only conclusion has been to simply blame the Administration. With a new Administration in Washington, the validity of this cause will be tested. President Eisenhower and his Cabinet have their work cut out for them and they can render Amer-

ican industry one great service by simply providing logical answers for policy decisions. Few industry leaders literally balk at Administration decisions in Washington, but most leaders are astounded by the reasons given for them.

Washington Outlook

(Continued from page 46)



SUPERSTRONG boxes and crates are just what the name implies—tough sturdy shipping containers built to protect your products from the worst of weather or the roughest of handling. They have stood the test in peace and war for nearly a century, and the valuable experience gained in this long period represents the extra something you obtain when you specify **SUPERSTRONG**.

If you have defense contracts or subcontracts, you will be interested to know that our facilities and equipment enable us to comply fully with Government packaging specifications. Contact us for full information on domestic or export shipping containers.

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whether sales in this amount are to be made will be subject to two major factors—(a) disposable income levels and (b) pricing changes—and one related factor, car scrappage.

Most important is disposable income. Insofar as the consumer is concerned, this means take-home pay after taxes and other deductions. This will depend not only on tax rates but also on how well industry and business succeed in developing and maintaining markets, thereby keeping up the present rate of employment.

Assuming that this can be done, it would mean that disposable income in 1955 can be calculated at about \$240 billion—an increase of seven per cent above 1951.

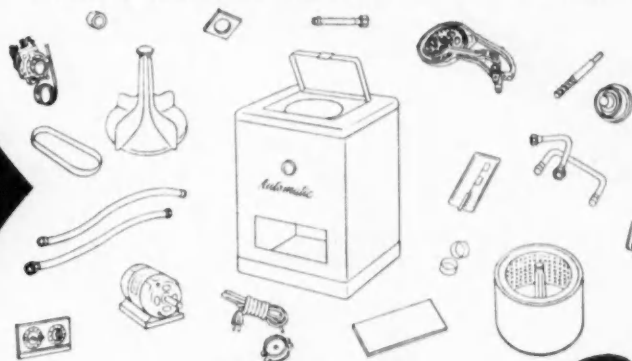
This would also mean from \$9-to-\$10 billion in new car sales under the present spending pattern. Expenditures for parts and accessories should mean \$1.5 billion with a little less than \$1 billion for tires and tubes.

It is at this point the second factor, pricing, enters the picture. The new car market is more sensitive to income and price changes than almost any other consumer good category. An increase in price apparently causes a greater than proportional (with respect to other durables) decline in sales. Conversely, a price reduction brings a greater proportionate sales increase.

As implied by the report, if a downward trend in prices can be brought about, whether by increased productivity or other means, this undoubtedly would provide "an extra stimulus" toward attaining the goal of 5 million cars or better a year.

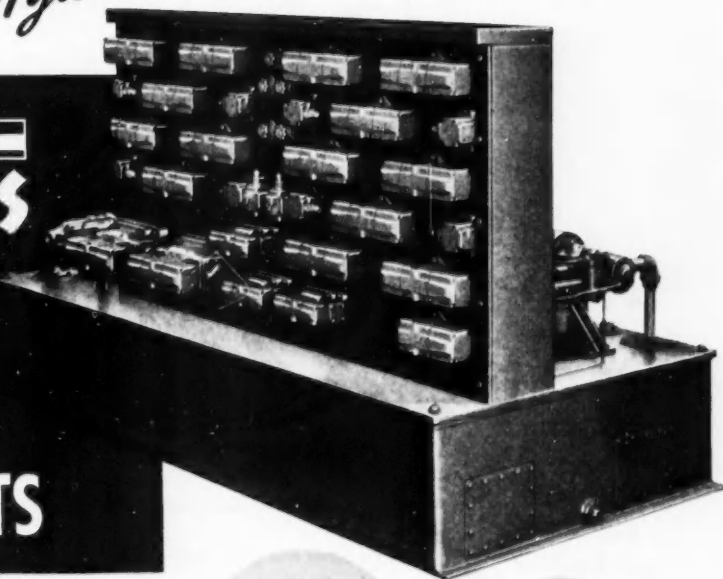
Scrappage will play a lesser part. In view of the increased number of cars on the road, the scrappage rate should be increased proportionately. But cars are generally more durable and are used for longer periods before being relegated to a junk yard. And even one year's extra use would affect the potential new car market.

You Wouldn't Buy
a Washing Machine
This Way



Then Why Buy Hydraulics Piecemeal?

VICKERS Custom-Built HYDRAULIC POWER UNITS



You would never go to the trouble of buying automatic washing machine parts and assembling them yourself. It would take a lot of time and patience and trouble. For one thing the maker could not risk guaranteeing the finished job. You buy a washing machine as a unit, and want the undivided responsibility of the manufacturer.

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Simplify
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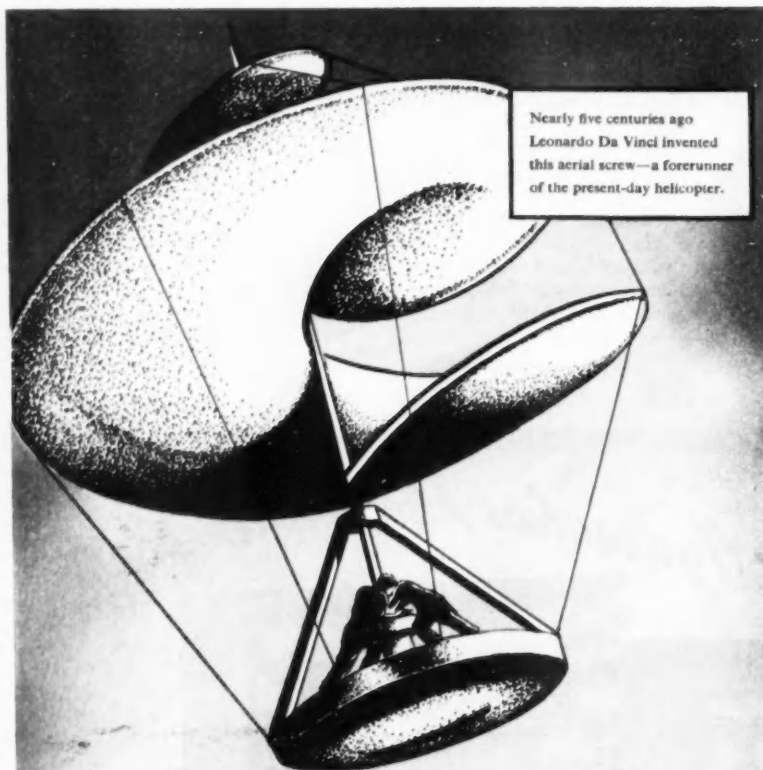
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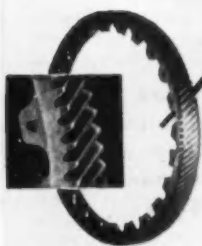


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To serve this great industry there are many manufacturers with imagination and vision. Indiana Gear is such a company—a group of able craftsmen equipped with the best of tools and machines—producing the finest in precision parts. At I.G.W. we accept the challenge of this and all other precision industries. We will match their visionary design with creative production.



Indiana Gear fabricated this large steel ring gear for the main transmission of a recent model Sikorsky Helicopter without grinding and without heat treat distortion. Originally, the helical teeth on this gear were ground, but a necessary power increase overloaded the part and it failed. It was assumed to be impossible to successfully heat treat the unground teeth, but I.G.W. produced the part without distortion and the gear operated successfully.



INDIANA GEAR

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The Business Pulse

(Continued from page 70)

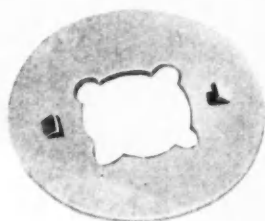
the forecasters that business will continue at very high levels, at least through the first half of 1953. Those who share this belief point to the large backlog of durable-goods orders now on the books of manufacturers, the expectations that defense spending will continue to rise moderately for several quarters, reports of planned acceleration of business investment in the early part of the year, and finally the current high level of employment and income. However, while business is expected to maintain approximately current levels, there does not appear to be much belief that it will show any great increase in terms of volume. In this connection, analysts stress the fact that as the new year began, there was virtually no idle manpower or capacity available for expansion.

Three Schools of Thought

Beyond the first half of 1953, there exists considerable difference of opinion as to business prospects. In general, there appear to be three major schools of thought. One group predicts that business will turn downward sometime during the second half of 1953. A second is inclined to think that business will hold up pretty well throughout the year but will drop off in 1954 or later. Finally, a third group—definitely a minority at present—sees little prospect of any significant downturn in business levels during this year or in any of the years immediately ahead.

Those who forecast a recession before the end of the present year almost uniformly emphasize the fact that under present mobilization schedules the nation is due to reach a peak in defense outlay at or shortly after midyear. They reason that the two-year-old decline in commodity prices is indicative of some underlying weakness in the present situation and think that, once the stimulus of rising defense expenditures is absent, that weakness will become manifest. This group is highly skeptical of recent surveys which point to continuing high levels of business investment throughout the year, holding that present plans will be sharply curtailed at the first sign of trouble. They generally think that the expansion of from 50 to 60 per cent in productive capacity during the postwar years has been excessive and believe

(Turn to page 120, please)



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tubes; precision bronze
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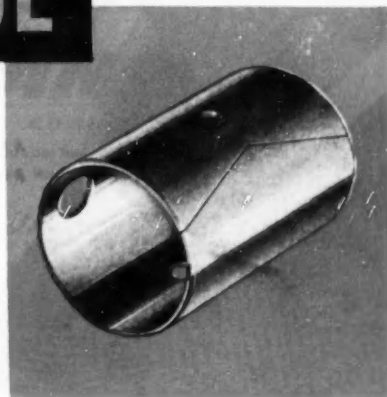


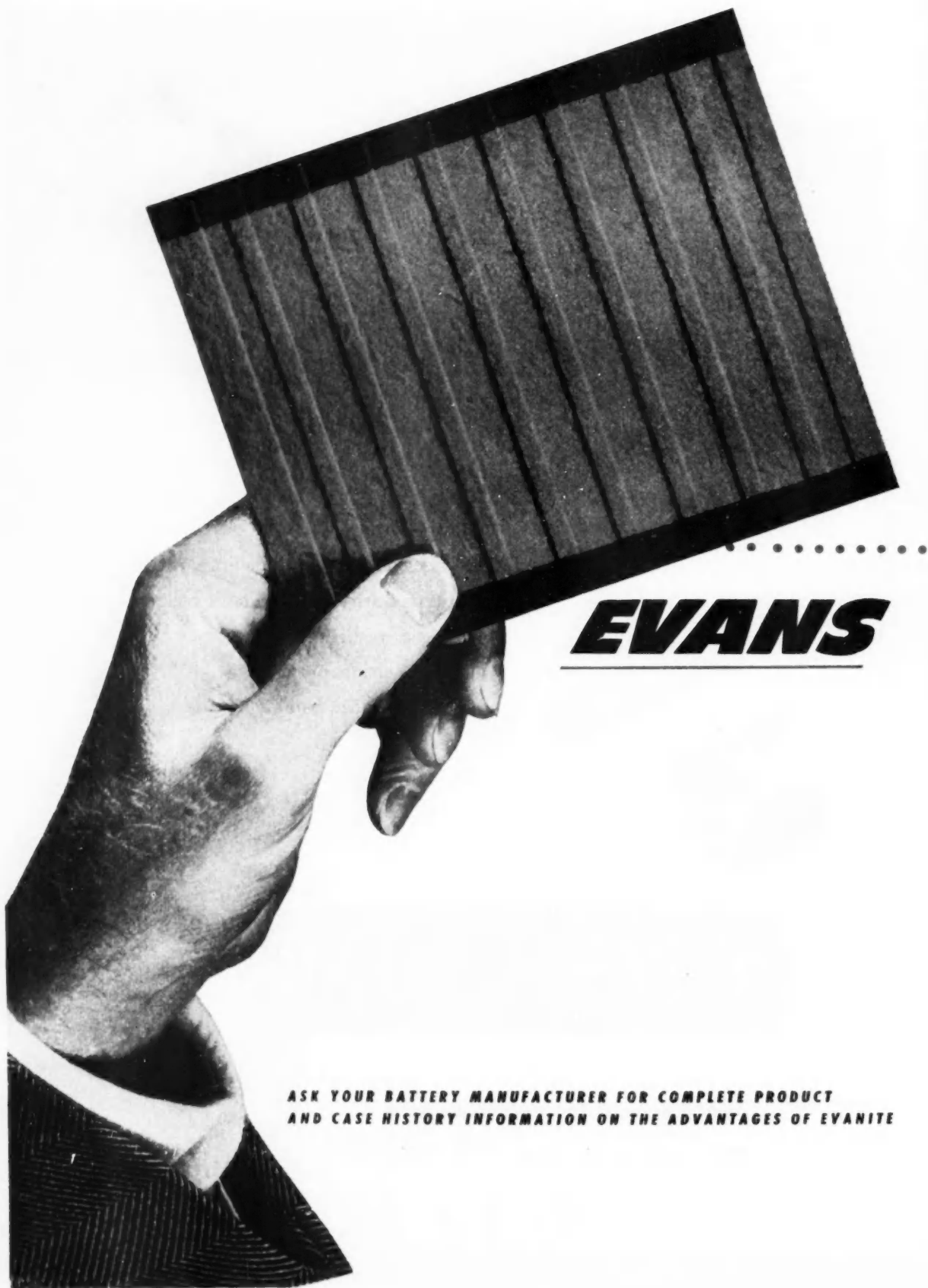
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- **CUTS SHIPPING COSTS**—Much lighter than ordinary separators.

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**WORLD'S LARGEST MANUFACTURER
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(Continued from page 116)

that a part of existing plant facilities will be forced into idleness once defense demands moderate.

Effect of Military Orders

Those who believe that business will be sustained throughout 1953 but will turn down later reason primarily along the same lines but differ in their estimate of when defense spending is likely to stop rising. Pointing to the loss of momentum in defense activity caused by last year's steel strike and to the revelation that another "stretch-out" is being plan-

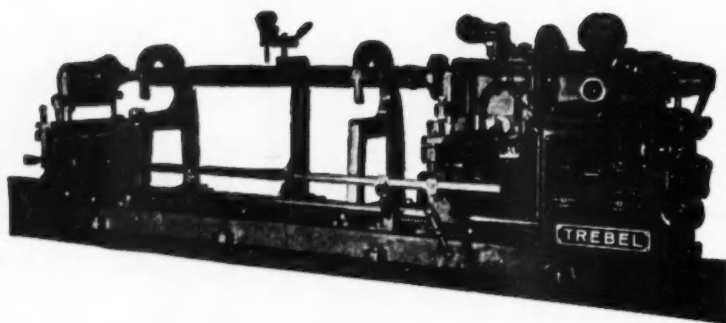
ned in defense goals, this second group believes that military outlay will be a stimulant in the economy for a longer period than had been formerly expected.

These two groups include some who apparently anticipate a rather substantial downturn in business activity. It has been forecast that output will fall by as much as 10 per cent from present levels and that employment may rise as high as eight million. Such views, however, do not appear to be typical, and a majority of those who expect a decline either in 1953 or later are probably think-

ing in terms of a much more moderate adjustment. It is frequently pointed out, for example, that State and local governments have accumulated an appreciable backlog of necessary public-works expenditures and that the social-security and farm programs of the Federal Government will tend to sustain income.

Those who discount the likelihood of an appreciable adjustment this year or in any of the years immediately ahead believe that adherents of the first two views are exaggerating the importance of military outlay as a stimulant and are neglecting other important considerations. They stress the fact that the eventual decline in defense spending will be relatively small and gradual and that, even after it has occurred, military outlay will continue to be substantial. They believe further that whatever demand is lost through such a decline will be offset by increased consumption expenditures by individuals once tax rates are cut. They do not agree with those who believe that postwar expansion has been excessive, contending that it has merely compensated for inadequate development during the depression and war. They are impressed finally with population growth as an important source of new demand.

In the light of these differing views, certain generalizations seem possible on the assumption that the "cold war" continues about the same. First, it would appear that we can look forward with considerable confidence to well-sustained business levels during the first half of 1953. Moreover, there seems good reason for believing that the level of activity during the second half of the year, if lower at all, will not be drastically lower. Beyond this it is difficult to strike an average among the several views, except that majority opinion appears to hold that any downward adjustment in the years immediately ahead will be of moderate proportions.



Balancing this 60" propeller shaft is no trouble with a TREBEL

THE propeller shaft is first dynamically balanced by spot welding two compensating weights onto the shaft ends near the universal joints. The exact size and location of these weights is indicated by the machine. Shaft is then accelerated to its critical speed and amount of deflection read off a dial. A third weight is welded on in the middle of the shaft opposite the point of maximum deflection to insure a smooth running condition at all speeds.

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Shafts up to 96" long, weighing from 20-130 pounds are accurately

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Unique Balancing Principle using a counter force to compensate for unbalance eliminates complicated set-ups and makes possible the indication in simple, easy-to-read units such as length of wedges in inches, or depth of a standard diameter hole, etc. Delivery is prompt. May we send you full details?

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A TREASURY OF COLLECTION LETTERS AND IDEAS, by Bernard L. Trippett, published by Universal Business Service, 201 Howard St., Greenwood, Miss. Price, \$2.00. Difficult problems of day-by-day collection management are treated in this 78-page booklet. Letters are presented to cover every collection situation in consumer and mercantile credit. The unearned discount problem, the problem of a debtor trading elsewhere, and the use of color in collection notices are analyzed.

"They called it a hansom cab ...and I was its handsome driver"



"WHEN I CLIMBED up into the driver's seat of that old Wood's Electric, I was sitting on top of the world! This was their hansom cab and they called me their handsome driver. I was a contented man.

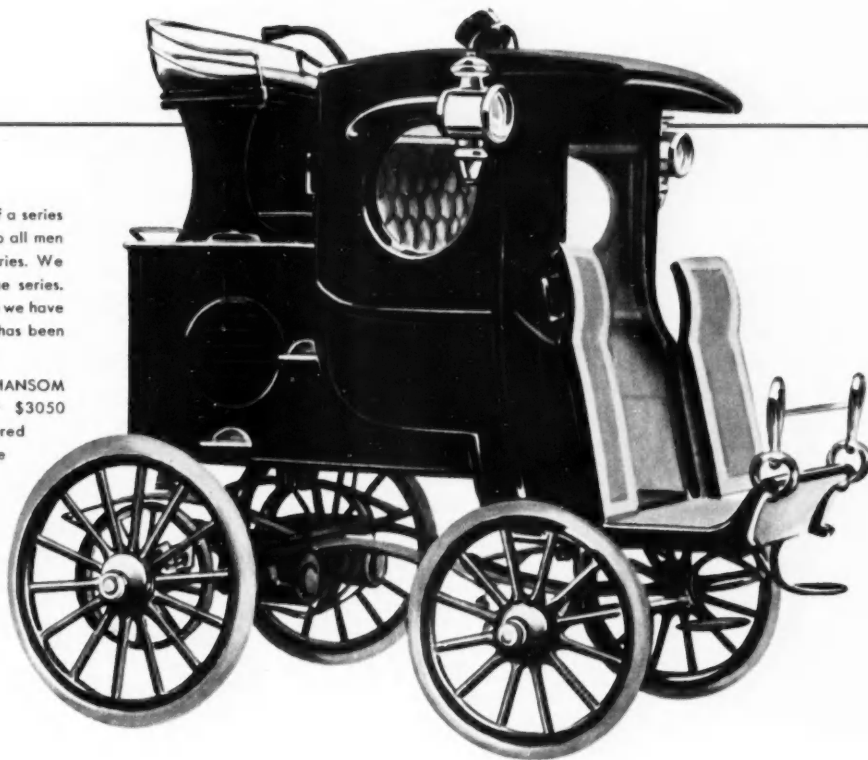
"We were never in a hurry, the Colonel, his wife, and I. They were very fine people; had a friendly way about them.

"When we went to the races, they insisted I remain on top of the car. Best seat at the track! And when we drove down Fifth Avenue on Easter morning, I had a perfect view of the parade. I saw everything clearly. Altho I couldn't help feeling rather important up there, the height was just right for me. You might say I had my head in the clouds, but my feet on the ground!"

(To draw a parallel, may we suggest that Automotive Color Stylists . . . creative men and women that they are . . . must also have their heads in the clouds, feet on the ground, the proper perspective, and an unclouded view at all times. To help maintain these obviously difficult demands, the Rinshed-Mason Company makes available to Automotive and other Industrial Color Stylists the consulting services of our own staff of Color Stylists and Technical Personnel. Feel free to call upon us at any time.)

THIS is the fifteenth advertisement of a series on historical motor cars dedicated to all men of the automotive and allied industries. We sincerely hope you are enjoying the series. If, perhaps, in giving pleasure to you we have gained one more friend, the effort has been very worth-while.

The 1899 WOOD'S ELECTRIC HANSOM CAB, reproduced here, sold for \$3050 when a dollar was worth five; offered a twenty-five-mile cruising range from one battery charge; top speed, 12 miles per hour. Color reproduction for framing sent on request. Please use your company letterhead. Supply limited.



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*Our Engine Bearings
are specified as
original equipment
by the leading
names in motordom
because they have
consistently
contributed to better
performance
for more than a
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DETROIT 11, MICHIGAN

New Products

For additional information please use postage-free reply card on page 65

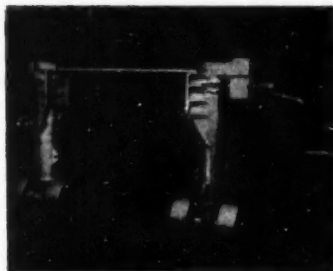
(Continued from page 64)

24 and 28.5-v tapped transformer and oil-filled rectifier is mounted in bottom of tester cabinet. A voltage selector switch and potentiometer are provided so that voltage may be adjusted to 28.5 v for testing units under correct voltage. *Sun Electric Corp.*

Circle P-7 on page 65 for more data

Truck Landing Gear

Now available is an aluminum landing gear for trucks that has been cast from aluminum alloy Almag 35. The screw mechanism and gears are said to be made from alloy steel.



The unit is reported to be available in either single or two-speed types, and the two-speed gear box is detachable. It is claimed that the weight of the two-speed unit is only 186 lb. *Commercial Truck Body Div., Binkley Mfg. Co.*


Circle P-8 on page 65 for more data

Derusting Compound

Recently announced is Descaler 2A for rapid removal of oxide and scale from steel. The product is acidic in nature and is available in a dry powder form.

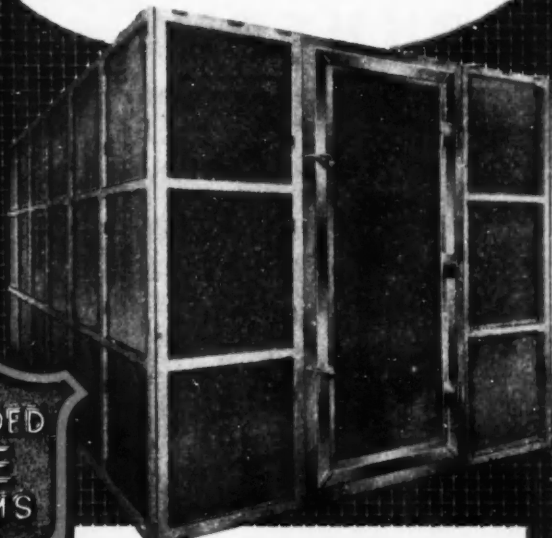
It is used in concentrations ranging from one to several pounds per gallon with temperatures ranging from 70 to 180 F. It is stated that the compound enables controlled acidity to be obtained for uniform pickling with a minimum of attack on the base metal. *Enthone, Inc.*

Circle P-9 on page 65 for more data
(Turn to page 134, please)



**Write today for your
New
ACE SCREEN ROOM
GUIDE**

This helpful booklet brings you the latest data on shielded enclosure construction, selection and use. Prepared by Ace screen room specialists, it includes latest Ace design features, an analysis of the factors influencing measurements of attenuation versus frequency, and suggestions for assuring maximum shielded enclosure efficiency. Ask for Ace Bulletin No. 3.



**SHIELDED
ACE
ROOMS**

**ELIMINATE
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in meeting JAN-I-225, MIL-I-6181, 16E4 (SHIPS)
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As long-time leaders in modern shielded enclosure development, Ace offers a complete range of "cell type" screen room shapes and sizes. Ace rooms are guaranteed to produce a minimum attenuation of 100 db from 0.15 to 1000 mc., and to closely approach this attenuation at 10,000 mc. Supplied in pre-built sectional form, they incorporate the latest developments in door design, line filters and service entrances. The list of Ace users includes top-ranking military and civilian equipment producers and laboratories throughout the world.

ACE ENGINEERING and MACHINE CO., INC.
3644 North Lawrence St., PHILADELPHIA 40, PA. • Telephone REgent 9-1019

PIONEERS IN SHIELDED ENCLOSURE DEVELOPMENT

Automotive Plans for 1953

(Continued from page 33)

Studebaker is spending \$625,000 for new facilities which will completely revamp its material handling setup to move fabricated bodies and hardware trim to the final assembly line. The project includes a 5310-ft conveyor belt to move finished bodies above street level from the body plant to the final assembly line. It will eliminate the truck-trailer method

formerly used and which caused a serious traffic congestion problem. With the new system, rear fenders will be attached to the body in the body shop, and body and fenders painted as a unit. Bodies will be carried above, or through, seven buildings for a distance of 2055 ft. On the return trip the conveyor makes a slightly longer journey, where it

picks up parts and conveys them to the body plant.

One company to watch on expansion is Ford which, while at the moment in something of a lull, is not by any means through with its projected expansion. The new Buffalo and Cleveland facilities are pretty well completed but it would not be surprising to see more plans for manufacturing and assembly units announced later this year. Ford has just announced plans for expansion of its automatic transmission facilities at Cincinnati with a new 350,000 sq ft plant. The first section of the plant may be in operation late this year, with part of the space devoted to defense work. The new plant would be confined to manufacturing operations, with the present transmission plant continuing manufacture and assembling. Borg-Warner Corp. will continue to produce automatic transmissions for Ford under contract.

Not only will new plants be built and older ones modernized or expanded, but considerable tooling will be purchased to bring plants up to date and to take care of new products such as power steering and new engines now under development. The industry is by no means static and will continue to spend sizable sums to make production more efficient and less costly.

A trend that gained momentum last year, and seems destined to continue, is the swing to higher priced and specialized models such as station wagons and the so-called customized cars. The trend toward the station wagon, or utility car, has been growing steadily since the end of the war with this type vehicle accounting for 4.3 per cent of all production last year compared with 3.6 per cent in 1951, 2 per cent in 1949, and 1.4 per cent in 1946. All companies report that the higher priced deluxe models are in heavy demand, running as high as 75 to 80 per cent in even some of the lower priced lines.

Another interesting development this year will be a shift by at least two companies toward a higher price range. Chevrolet, with its new Bel-Aire line, will move up into the lower medium priced field in an attempt to capture part of that market. At the opposite end of the scale, Packard will make even a more determined effort to capture part of the prestige market currently dominated by Cadillac. Lincoln and Chrysler also have the same objective.

Another new development this year is the introduction of customized convertibles, such as the Buick Skylark, Cadillac Eldorado, and Packard

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Thorough and complete attention by the entire Johnson Tappet organization to these important working parts of your engines assure you of maximum tappet life and performance.

SELF LOCKING TAPPET SCREW

Originated by Johnson this diaphragm type Self Locking Tappet Screw is operating successfully in millions of cast iron and steel tappets.



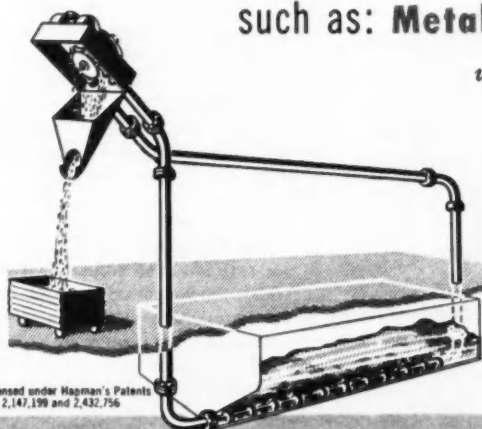
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INC.

MUSKEGON, MICHIGAN

Get automatic **LOW COST** handling of loose materials
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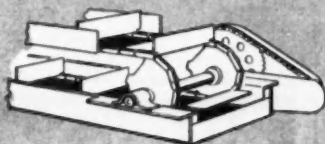
with

HOUDAILLE

Automatic Conveyors

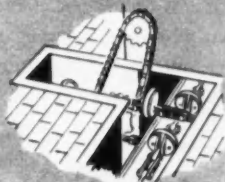
Houdaille Chain Drag Conveyors

Completely enclosed flights and chain automatically collect, transport and discharge chips, sludge, scale and other types of solid or fibrous material which settle to the bottom of tanks or hoppers. Standard pipe sizes — 3", 4", 6", 8". Larger sizes on request. Choice of chains, flights, casings, accessories also available.



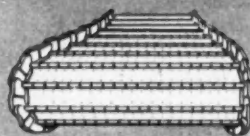
Houdaille Slot Type Conveyors

Slot type trough conveyors, operating individually or in sequence, transport material to any given point—can be operated continuously or intermittently as desired. Slots and chain move material in open troughs, return automatically to collection or transfer points.



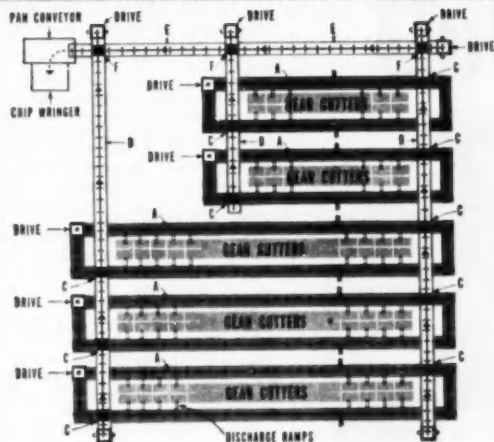
Houdaille Open Trough Conveyors

Chain Drag Conveyors installed in open troughs, running above or below floor level, offer many advantages in different types of operations. Below-floor-level installation, illustrated, continuously removes steel chips from machine tools, keeps system from interfering with heavy traffic plant areas... yet offers access to chain and flights at any point of circuit.



Houdaille Pan Type Conveyors

One-piece, heavy-gauge steel plates, featuring all-welded hinge construction, lock together firmly by means of connecting rod to form perfect pan-type conveyor for chips. Welded hinges, rod connections and side wings, securely interlocked even when chain negotiates sprockets or turns, prevent fall-through of material or jamming of conveyor. Plates perforated for drainage, depending on application. Ideal for installation on individual machines or large central chip handling systems.



TYPICAL OPEN TROUGH CHAIN CONVEYOR LAYOUT

Nine 6" Houdaille Open Trough Chain Conveyors operate automatically and continuously to remove steel chips from 300 Gleason Gear Cutters in large automotive plant. Five of the conveyors (A) pick up steel chips deposited into troughs (B) by the gear cutters. Each of the five conveyors services a battery of gear cutters aligned in a double row. Trenches, accommodating the open trough conveyors, wind completely around each double row of gear cutters up one side and down another. Chips empty into the troughs by means of a discharge ramp extending from each gear cutting machine.

Each of the five conveyors discharges chips at two points on their individual circuits (C). Here, three other 6" open trough chain conveyors (D), operating over and under the first five conveyors, collect, transport and ultimately discharge all of the chips into one main 6" open trough chain conveyor (E) at three points (F). At these points the chips are carried along the trough to a pan conveyor which discharges regularly into a chip wringer.

**NEW
COMPREHENSIVE
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with complete information on all Houdaille conveyors is
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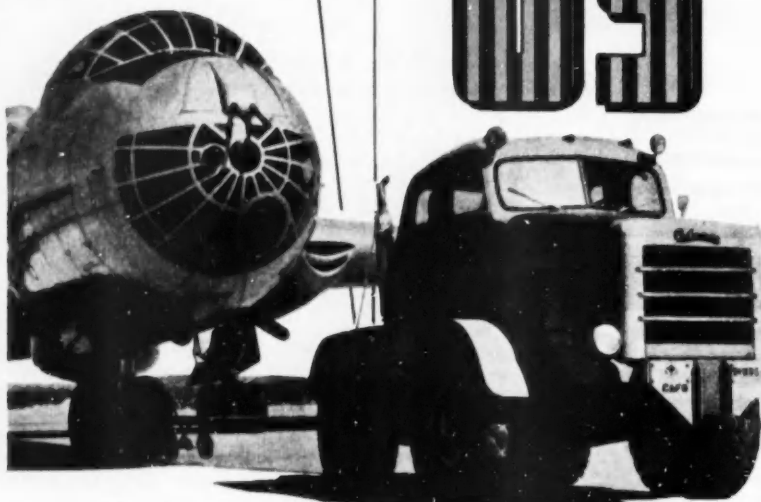
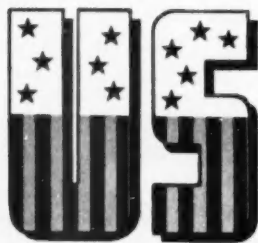
★ Above: Twin Disc Model CF 3-stage Torque Converter equipped with engine cut-off clutch. Below: The Twin Disc equipped Coleman CF-55-AF Tractor towing a B-36 Bomber at a U. S. Air Force Base.

Power performance is stepping up rapidly in civilian as well as military use. And, as they have since World War I, the nation's leading manufacturers look to Twin Disc for new and better ways to transmit the power.

For example, American-Coleman, manufacturer of the powerful 4-wheel drive Towing Vehicle pictured, found "the right answer" to the tough yet delicate job of moving 400,000-pound bombers, huge troop carriers, air cargo haulers, in the combination of Twin Disc Hydraulic Torque Converter with engine cut-off clutch and reverse gear unit.

The pressure is on for greater production from machinery in manufacturing, construction, logging, mining, transportation, agriculture, petroleum, fishing . . . for

More Power to



...and Twin Disc
applies the Production
Power!



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

Caribbean, which carry prices considerably above the conventional lines. Practically all companies will have something of this nature, although none of them has any illusions about a volume market.

Although vehicle production declined last year, new highs were hit in some other phases of automotive activity. Employment, which dipped sharply during the year, rose to an all-time high at the first of December, standing at 900,000. Special taxes on motor vehicles also hit a new high of an estimated \$5 billion last year, of which trucks contributed \$1.45 billion. Automotive vehicles also made a new record for usage with a total of 500 billion miles of travel last year. As a natural consequence, gasoline consumption also rose to 40 billion gallons, an increase of nearly 2 billion.

BOOKS...

FATIGUE AND FRACTURE OF METALS, a symposium edited by William M. Murray, with a foreword by Jerome C. Hunsaker, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., and The Technology Press, Cambridge, Mass. Price, \$6.00. The text of this 313-page book stems from contributions to a special conference on fatigue and fracture of metals held in June, 1950, at Massachusetts Institute of Technology. It is a compilation of papers presented by recognized specialists in their respective fields, recording a focus of existing knowledge of the phenomenon of fatigue failure and of the major problems confronting practitioners and research men in this field. Since it is a symposium of enormous technical scope, the text defies attempts at condensation. However, an idea of its comprehensiveness can be given by listing the subjects and authors: "General Survey of the Problems of Fatigue and Fracture," by M. Gensamer; "The Fatigue Problem in Airplane Structures," by Dryden, Rhode and Kuhn; "Brittle Fracture and Fatigue in Ships," by F. Jonassen; "Brittle Fracture and Fatigue in Machinery," by R. E. Peterson; "Internal Stresses and Fatigue," by O. J. Horger and H. R. Nelfert; "Designing for Fatigue," by R. L. Templin; "Fundamentals of Brittle Behavior in Metals," by E. Orowan; "Experimental Study on Temper Brittleness of Slightly Alloyed Carbon Steel," by Jacquet and Welli; "The Statistical Aspect of Fatigue Failures and Its Consequences," by W. Wibull; "Review of Cumulative Damage in Fatigue," by N. M. Newmark; "Significance of Transition Temperature in Fatigue," by C. W. MacGregor; "The Influence of Metallographic Structure on Fatigue," by P. L. Teed; "Fatigue at Elevated Temperatures," by N. J. Grant; and "Techniques of Physical Metallurgy for Study Fatigue Damage," by J. T. Norton. The complete blanketing of this vital subject by the panel of experts should be of real value to designers, metallurgists, research men, and others engaged in the design of structures and machinery.



TRANSPORTATION GASOLINE ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N4062	4	2½	3½	62	26 @ 3400 RPM
Y4069	4	2½	3½	69	28 @ 3400 RPM
Y4091	4	2½	3½	91	36 @ 3400 RPM
F4124	4	3	4½	124	47 @ 3200 RPM
F4140	4	3½	4½	140	52 @ 3200 RPM
F4162	4	3½	4½	162	58 @ 3200 RPM
F6186	6	3	4½	186	77 @ 3500 RPM
F6209	6	3½	4½	209	90 @ 3500 RPM
F6226	6	3½	4½	226	99 @ 3500 RPM
M6271	6	3½	4½	271	97 @ 3000 RPM
M6290	6	3½	4½	290	108 @ 3000 RPM
M6330	6	4	4½	330	125 @ 3000 RPM
K6271	6	3½	4½	271	115 @ 3200 RPM
K6290	6	3½	4½	290	123 @ 3200 RPM
K6330	6	4	4½	330	145 @ 3200 RPM
B6371	6	4½	4½	371	124 @ 3000 RPM
B6427	6	4½	4½	427	142 @ 3000 RPM
T6371	6	4½	4½	371	144 @ 3000 RPM
T6427	6	4½	4½	427	165 @ 3000 RPM
U6501	6	4½	5½	501	178 @ 2600 RPM
R6513	6	4½	5½	513	180 @ 2800 RPM
R6572	6	4½	5½	572	200 @ 2800 RPM
R6602	6	4½	5½	602	212 @ 2800 RPM
S6749	6	5½	5½	749	250 @ 2800 RPM
S6820	6	5½	5½	820	277 @ 2800 RPM

TRANSPORTATION DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
TD6427	6	4½	4½	427	116 @ 2400 RPM
RD6572	6	4½	5½	572	156 @ 2200 RPM
SD6802	6	5½	5½	802	218 @ 2200 RPM

Cut Hauling Costs ...with Specialized RED SEAL POWER

No matter what your hauling job, it's wise to choose a vehicle with a Red Seal under the hood. In that way, you get the benefit of truly specialized power, for there's a Red Seal engineered to the needs of every transport job. Continental builds 25 different gasoline models, from 26 to 277 h.p.—plus three Cushioned Power Diesels with bare engine horsepower ratings of 116, 156 and 218—all for transportation use. For lowest ton-mile costs throughout the life of the vehicle, choose a make with Continental Red Seal. Save, too, by replacing old engines in present equipment with the right Red Seal from the accompanying list.



PARTS AND SERVICE EVERYWHERE

Continental Motors Corporation

MUSKEGON, MICHIGAN

TWO new engines plus Hydra-Matic drive are among features of the 1953 line of light trucks announced by GMC Truck and Coach Division of General Motors Corp. The engines, of 228 and 248 cu in. capacities, are modeled after the 302 cu in. GMC engine used in the GMC tactical military 6x6 truck and in the GMC 450 and 470 commercial models. The new engine designs, using the same cubic inch capacity as previous models, provide increased horsepower, efficiency of operation, and stepped-

GMC Light Trucks for '53

up compression ratios and torque. Net horsepower has been increased by 5½ per cent in the 228 and 10½ per cent in the 248 engines.

The combustion chambers of both engines have a design similar to that of the 302 cu in. GMC, a smooth,

shallow, dome-chamber shape which confines the fuel charge close to the spark plug for short flame travel. The anti-knock qualities of this design are achieved by the spark plug and valve positions, the shape of the chamber, and the precision quench area. The engines are designed to operate on regular fuel. The new design not only permits the high compression ratios but is said to provide clean operation which keeps combustion chambers remarkably free of carbon even after long periods of operation.

Manifolds and valves, both intake and exhaust, are of generous size. Both engines have the large bore-short stroke design which gives good thermal and mechanical efficiency.

Fuel economy has been improved in both engines, especially so in the 228 where tests are said to have shown a 14 per cent increase in gasoline mileage. The 248 can be expected to show comparable improvements in ton-mile economy figures.

Both new engines have improved Moraine Durex main and connecting rod bearings, while the rods are shaped like those in the 302 engine, having a larger cross-section at the upper end to reduce stress. The crankshaft is "Tocco" hardened and stress relieved, and the crankcase and cylinder block have been sturdied by increasing the thickness of webs and cylinder block stud bosses. The cylinder head also has been strengthened to withstand higher cylinder pressures.

All the new GMC light models will be equipped with a six-volt generator of 45-amp rated capacity.

Hydra-Matic, which will be a regular production option in models 100-22, 150-22 and 250-22, is expected to have the best acceptance for stop-and-go city operations and in those applications where the truck may be used both for business and family driving such as on farms. An automatic choke is included with the Hydra-Matic transmission.

While some of the 1952 light models had the Duo-Servo type brake, all 1953 GMC's from the 100-22 through the 250-22 will have Duo-Servo on both front and rear.

Front axles in GMC models 150-22 and 250-22 have been changed to improve stability, durability, resistance to road shock and increased life. The changes have been made in the steering knuckle, kingpin, upper and lower kingpin bushings, steering knuckle yoke, kingpin boss and spindle diameter.

Models 280-22 and 300-24 are now equipped with a new front axle of
(Turn to page 132, please)

For Tops in High Voltage Insulation



you can
count on

FRENCHTOWN CERAMICS

. because of constant quality control

Test after test assures long life and dependable performance of spark plugs made with Frenchtown insulators. Every insulator—and all other Frenchtown ceramic parts—are given rigid tests for high dielectric strength and superior surface quality before and after glazing. Firing is accurately controlled to insure close tolerances, high heat resistance and mechanical strength.

Through research and development, Frenchtown engineers are constantly improving product quality to anticipate customers' requirements. These are the plus factors that mean top performance of any Frenchtown porcelain parts you may specify. Don't fail to send today for current engineering data and any design help you may need.

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• sockets
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90% of all nutrunning problems can be solved efficiently and economically by using one or more of the thousands of stock types and sizes of Apex sockets, extensions, adapters and universal wrenches.

And, if your operations come under the special 10%, you'll still find the answer at Apex. For Apex will build tools to meet your specific nutrunning requirements.

If you're plagued by tool breakage or quick wear-out,

you don't have to compromise on tools that merely come close to your requirements—Apex will build tools to match your requirements exactly.

We'd suggest you look through Catalog 29 first (just drop a line on your company letterhead for your copy). If you don't find the solution to your nutrunning problem there, then send us a sketch or blueprint outlining your particular problem. We'll quote promptly, without any obligation to you.

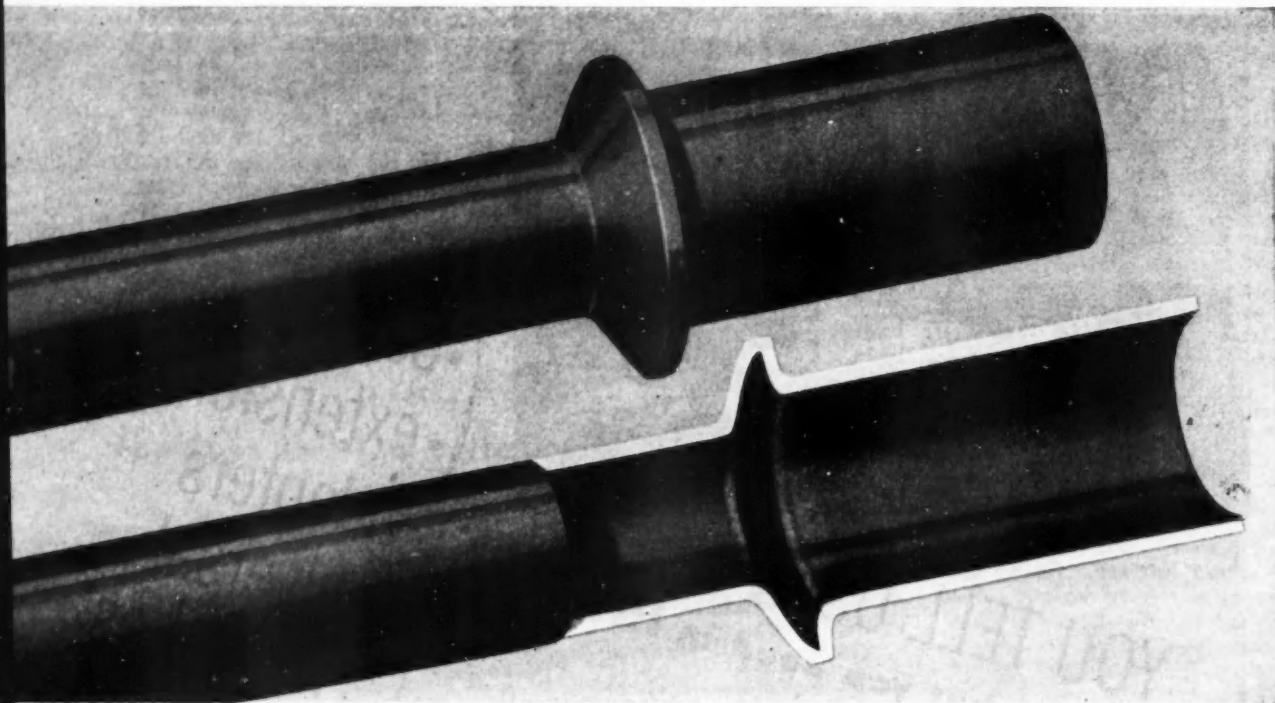


APEX
TOOLS

sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY
 1043 S. Patterson Blvd., Dayton 2, Ohio

POWER BITS, INSERT BITS AND BIT HOLDERS, FOR PHILLIPS, FREARSON (Reed & Prince), SLOTTED, CLUTCH HEAD and SOCKET HEAD SCREWS • HAND DRIVERS FOR PHILLIPS, FREARSON AND CLUTCH HEAD SCREWS • TWO-PIECE DRIVERS FOR HEX HEAD SCREWS • SOCKETS, EXTENSIONS, ADAPTERS AND NUT SETTERS • UNIVERSAL SOCKETS, EXTENSION WRENCHES AND ADAPTERS • AIRCRAFT AND INDUSTRIAL UNIVERSAL JOINTS • SELF-RELEASING AND ADJUSTABLE STUD SETTERS • SAFETY FRICTION TAPPING CHUCKS • VERTICAL FLOAT TAPPING CHUCKS.



1 Here's a problem part clearly showing the results you get when Bundy engineers are on your team. The part, for the servomechanism on a braking system, called for an end expansion from $\frac{3}{8}$ " to $\frac{1}{2}$ "—an extreme expansion even for Bundyweld. Complicating matters, an upset was

required on the expansion. Low-cost, accurate result is a tribute both to the fabrication beating Bundyweld will take and to the talents of Bundy engineers. It is also a sure indication of the successful results you can expect from Bundy on your problem parts—and your easy-to-make ones.



Look at all you buy in Bundyweld Tubing

WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .

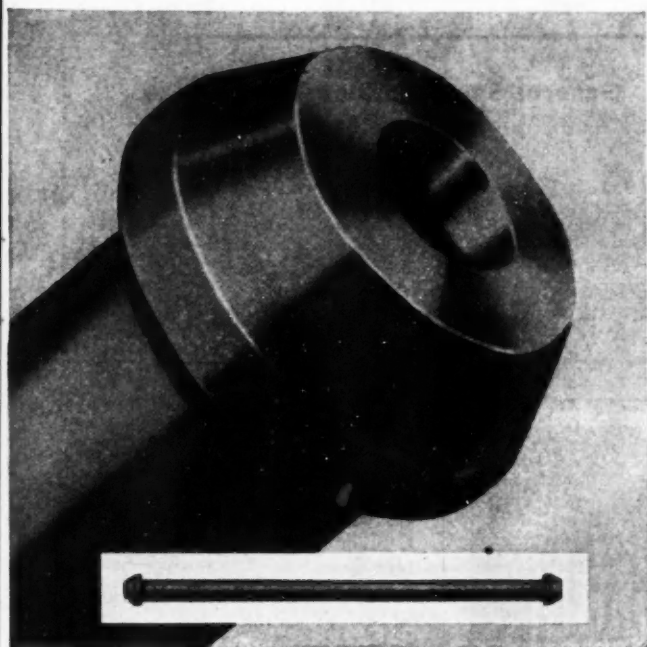


Bundyweld, double-walled and brazed through 360° of wall contact.

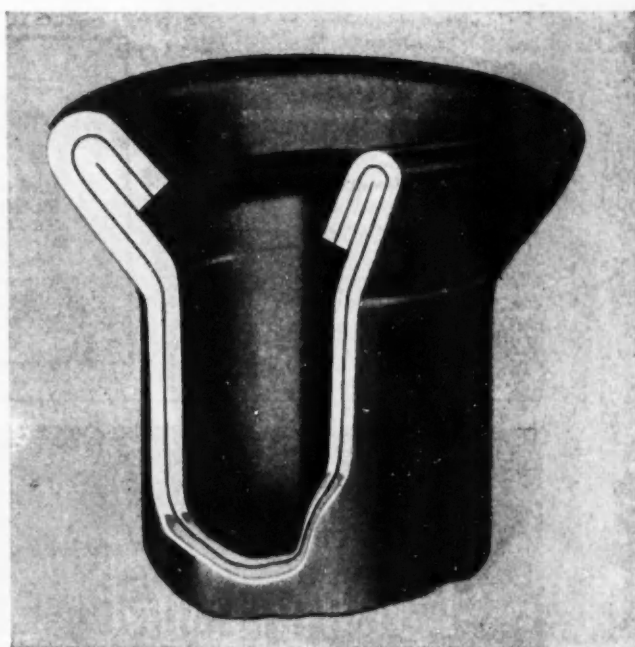


NOTE the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Pelison-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lapham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Philadelphia 3, Penn.: Rulon & Co., 1717 Sansom St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave. South Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 181 Fleet St., East • Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.



2 Small-bore, heavy-walled parts produced economically at Bundy. Pictured above is a diesel engine fuel-injector tubing part. Note smallness of bore in relation to wall thickness. I.D. is accurately held. Tubing is free of scale and dirt, retains ductility for easy upsetting. Finished part has immense bursting strength to withstand high-compression operating conditions. If there's a way to produce a better part at less cost, Bundy will find it.



3 Ten million a month means low cost. Bundy double flares are produced at the low-cost rate of over 10,000,000 a month on special machinery designed and built by Bundy. The flare, adopted as standard by the SAE and automotive industry, provides customers with extra safety where there must be: 1) leaktight joints; 2) effective resistance to greater wrench torque on fittings; 3) protection in frequent coupling and uncoupling of fittings.

In Bundyweld, you buy the automotive industry's safest, most dependable tubing for your brake lines, gasoline and oil lines, and hydraulic window-lift lines. Bundyweld's twenty-two-year record of dependability speaks for itself.

You buy tubing properties unequalled anywhere. Bundyweld is the only tubing double-walled from a single strip, with patented beveled edges. It's copper-brazed through

360° of wall contact. It's extra-strong, yet lightweight; leakproof; extra-resistant to nicks and shocks. It has high fatigue limit, high bursting strength.

You buy engineering talents and fabrication facilities second to none. If you need help in the design or fabrication phases of a tubing part, call in Bundy engineers. They'll go to work, come up with a quick, low-cost answer to your problem.

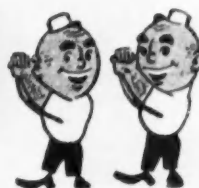
If you wish, turn fabrication work over to us. We'll mass-produce your parts letter-perfect. We'll inspect them, pack them properly, and rush them to you right on schedule.

For tubing that's the lifeline of your cars, tractors, or trucks—for engineering talents and fabrication facilities dedicated to getting you perfect-functioning parts at lowest cost—come to Bundy, world's largest producer of small-diameter tubing.

BUNDY TUBING COMPANY • DETROIT 14, MICHIGAN

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP



(Continued from page 128)

4000-lb capacity featuring an improved steering knuckle and a center beam of new design.

On the GMC model 300-21 there will be offered a two-speed rear axle option which permits use of 8.25/20 rear tires on wide base 20x6.0 rims. The combination of the 248 engine power, Duo-Servo front and twin-action rear brakes along with the option of two-speed axle and 8.25/20 rear tires creates a high-power, high capacity truck.

General Specifications 1953 GMC Light Truck Engines

	228 Engine	248 Engine
Max. Gross Brake hp.....	105 @ 3600 rpm	125 @ 3600 rpm
Max. Net Brake hp.....	95 @ 3400 rpm	115 @ 3400 rpm
Max. Gross Torque (lb ft).....	185 @ 1200-2200 rpm	210 @ 1200-2400 rpm
Max. Net Torque (lb ft).....	181 @ 1400-1800 rpm	206 @ 1200-1400 rpm
Compression Ratio.....	8.0 to 1	7.5 to 1
Bore (in.).....	3 ⁹ / ₁₆	3 ²³ / ₃₂
Stroke (in.).....	3 ¹³ / ₁₆	3 ¹³ / ₁₆
Piston Displ. (cu in.).....	228	248.5

Distinguished Quality



GABRIEL
SHOCK
ABSORBERS

An improved three-speed transmission is available on the series 100-22 and 150-22. A double-row needle roller bearing provides increased stability at the front of the mainshaft, and minimizes the possibility of unintentional disengagement of third gear.

A side-mounted spare tire carrier will be optional with pickup body on models 101-22, 152-22 and 253-22. Advantages of this mounting are the accessibility and freedom from road splash and dirt.

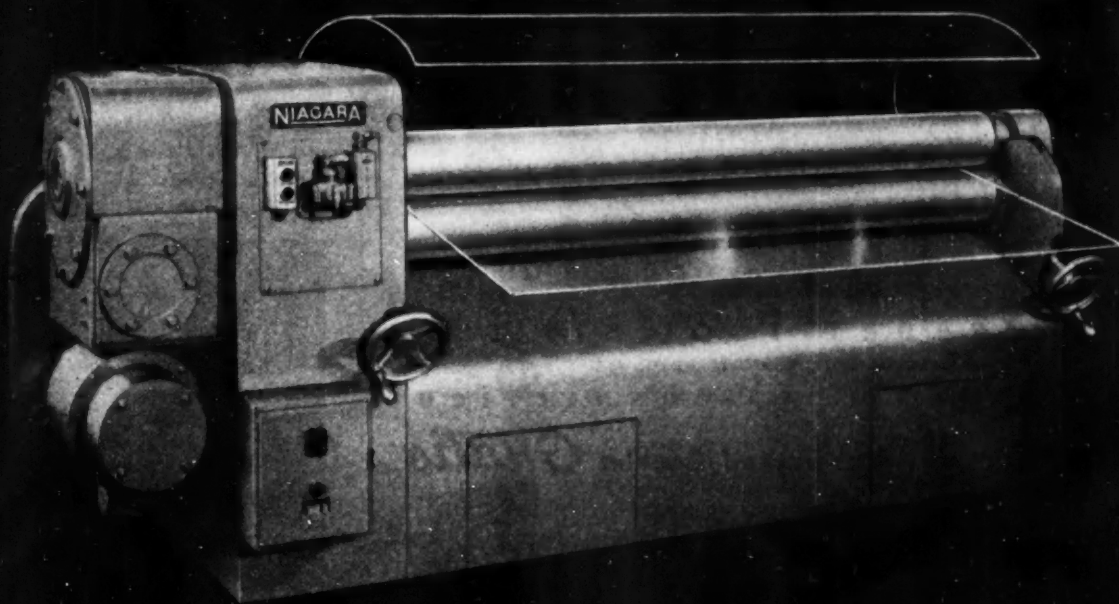
BOOKS...

A TREATISE ON MILLING AND MILLING MACHINES, published by the Cincinnati Milling Machine Co., Department R.M., 4701 Marburg Ave., Cincinnati, O. Price, \$8.00. This 896-page volume with over 700 illustrations has been compiled to answer practically every metalworking problem encountered in the field of milling, from definitions of various types of machines to economics of machine replacement. In addition to the numerous pages of text and illustrations, the book contains over 200 formulae to aid in solving various problems which come up in shop practice. Listed as special new features are: the theory of milling practice and what occurs under different conditions during the milling process; practical toolroom applications, illustrated with actual jobs, worked out with complete job data, and photographed in various stages; and selection of the most efficient production milling method and an analysis of the many factors involved in each individual job.

THE CASE FOR RE-REFINED OIL, published by Association of Petroleum Re-Refiners, 1917 Eye St., N. W., Washington 6, D. C. Price, \$3.00. Presented in this publication are facts on ways to cut motor oil costs through the use of re-refined oil. The book seeks to inform the reader on the ways in which re-refined oil cannot only save money for commercial oil users but can also aid in conservation of a vital natural resource. Subjects covered include: the technology of re-refined oil; the industry as presently constituted; its services to commercial users and the nation; and the problems facing the industry.

NIAGARA

ANNOUNCES



**new
all steel**

BENDING ROLLS

6" Roll Series
Capacities 5/16" x 48";
3/16" x 72" and 12 ga x 120"

Write for new Bulletin 88

- ▶ Produces commercially true cylinders from thinnest sheets to maximum capacity.
- ▶ Rolls a multitude of bends in various shapes including oval forms, rectangular pipes, rounded end containers, cones etc.
- ▶ Pinch-type construction materially reduces flat spots on leading and trailing edges of work.
- ▶ All three rolls power driven permitting smaller diameters and easy operation with light gage sheets.
- ▶ Air operated drop end automatically tilts upper roll for easy removal of rolled cylinder.
- ▶ Power adjustment for rear roll saves time and effort.
- ▶ Roll position indicators allow operator to quickly duplicate roll settings for repeat jobs.
- ▶ Rapid reversal and positive jogging of rolls gives operator accurate control at all times.
- ▶ Magnetic brake on main motor prevents "drifting" of work, enabling operator to do accurate work without guessing.
- ▶ Unbreakable steel construction. ▶ No special foundation required.

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

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Dealers in principal U. S. cities and major foreign countries

GET YOUR KEYS TO BETTER VALVE SEATS—FASTER



WATERBURY TOOL DIVISION
VICKERS INCORPORATED DEPT.—A1-1
WATERBURY 20, CONNECTICUT

this fact-packed booklet *Gratis*

"SYNCHRONIZED VALVE SERVICING":

- *ECCENTRIC over concentric grinding.
- *Maximal precision in valve seating.
- *Elimination of tappet adjustment.
- *Production savings in time and costs.
- *"Specialized" Eccentric Production and Servicing Equipment.



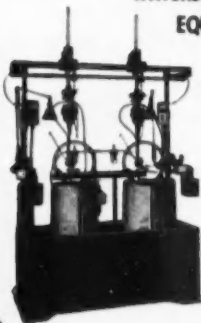
WATERBURY-HALL SPECIALIZED ENGINEERING AND TECHNICAL SERVICE *Gratis* **TO HELP YOU IN YOUR VALVE SEAT GRINDING PROBLEMS.**

WATERBURY'S VALVE SEAT GRINDING SPECIALISTS have enjoyed the privilege of working closely with world famous Engineering Staffs on special production and servicing problems

**FORD
CHRYSLER
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LYCOMING**

**USAF
U.S. NAVY
NEW YORK CENTRAL
CAPITOL AIRLINES**

WATERBURY-HALL "SPECIALIST" VALVE SEAT GRINDING EQUIPMENT WITH NEW FORCE-FEED HEAD



Model AVO. Dual Production Wet-Type Air-oil Lubricated Eccentric Valve Seat Grinder with NEW FORCE-FEED Head — for Radial Type Aviation and Tank Engines. Also available in a Single Spindle Unit for service or production, using the NEW FORCE-FEED Head Mechanism.

NEW force-feed head for faster grinding. Available as original equipment or for conversion.



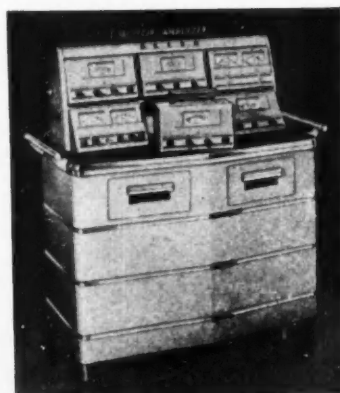
New Products

For additional information please use
postage-free reply card on page 65

(Continued from page 123)

Testing Equipment

Now on the market is a line of six and 12-v testing and servicing equipment. A two-tone gray and green chip-proof baked enamel finish is used on all models.



Included in the line are two complete motor analyzers. (See cut)—Standard Model E-1200 and Utility Model E-1222. Both analyzers test detached six and 12-v coils, and the individual test units operate from a six or 12-v battery for on-the-car use.

Also included in the line are two Syncograph distributor testers.—Standard Model E-1216HD and Utility Model E-1219. *Allen Electric and Equipment Co.*

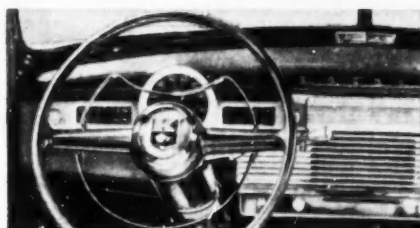
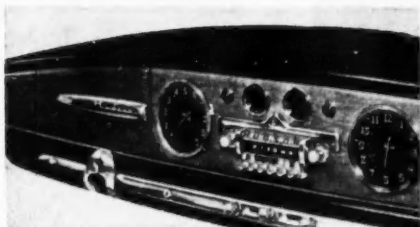
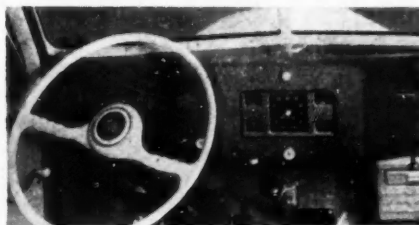
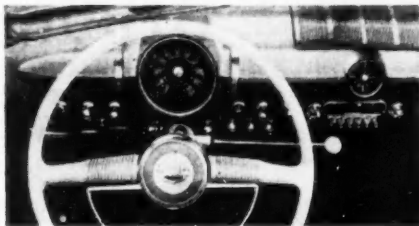
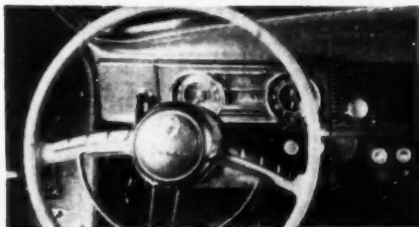
Circle P-10 on page 65 for more data

Electronic Controller

Recently announced is an electronic controller that reportedly can actuate an electric brake in five one-thousandths of a second. In addition to its increased operating speed, it is claimed that the unit can be controlled at any distance from the brake, either by a standard wire connection or by a transmitted wave, similar to a radio wave.

An unusual safety feature of the controller is said to be a twin stopping circuit. Should one circuit fail, the other will actuate the control in two ten-thousandths of a second, ac-

(Turn to page 138, please)



FIVE of the REASONS

for the Superiority of



DASHBOARD INSTRUMENTS

King-Seeley electric dashboard instruments have long been superior in the automotive field because:

1

Their performance is always reliable—gives the car owner no cause for a gripe.

2

All connections are made with standard electric wire, thus they are easily installed by production line methods.

3

No tubing is needed. Wires are used instead. Consequently the danger and annoyance of broken tubes are eliminated. No tubing holes in the dash. Engine noises cannot be telegraphed to the dash as they are by tubing.

4

The vehicle manufacturer can always depend on strict adherence to the delivery schedules of King-Seeley instruments.

5

King-Seeley research engineers are constantly searching for a way to improve the effectiveness, dependability, and economy of these instruments.

In the last seventeen years 50,000,000 K-S instruments have been installed in automobiles and trucks. For more detailed information, write to King-Seeley or ask for a representative to call.

KING-SEELEY CORPORATION
ANN ARBOR, MICHIGAN

PLANTS AT ANN ARBOR, SCIO, AND YPSILANTI

You don't have to heat-treat pre-hardened U-S-S Carilloy **FC** steel

—it's quenched and



Heavy-duty shafts made without heat-treating — At the Monongah, W. Va., maintenance shop, Consolidation Coal Co. uses U-S-S CARILLOY FC steel for heavily-stressed repair parts for their mining equipment. Each new part must be as strong or stronger than the

original that it replaces—and without benefit of heat-treating after machining. Pre-hardened, free-cutting CARILLOY FC is giving excellent service in shafts, axles, pins, screws, and other high-strength parts, and it is easier to machine than comparable alloy steels.

You can make all of these parts with U-S-S CARILLOY FC steel

Arbors	Chain Pins	Dies	Gears	Nuts	Racks	Spring Collets
Armature Shafts	Chuck Bodies	Die Bodies	Guide Pins	Pinch Bars	Ratchets	Straightening Rolls
Axles	Chisels	Drift Pins	Hammers	Pinions	Reamer Bodies	Studs
Ball Bearings	Chisel Bushings	Drill Shanks	High Tempered Bolts	Pins	Reamer Shanks	Swaging Rolls
Ball Races	Clash Gears	Elevating Screws	Hydraulic Rams	Pipe Cutter Wheels	Rollers	Tap Shanks
Brake Press Dies	Clutches	Embossing Dies	Jigs	Piston Rods	Screws	Tool Bodies
Blanking Dies	Collets	Expanding Mandrels	Keys	Pitman Screws	Screw Drivers	Tool Post Screws
Bolts	Connecting Rods	Feed Screws	Knuckle Pins	Plastic Molds	Shafts	Trimming Dies
Boring Bars	Connecting Rod Bolts	Forge Hammers	Knuckle Shafts	Pliers	Shear Blades	"U" Bolts
Bucket Teeth	Coining Dies	Forge Rams	Lead Screws	Power Drive Bits	Sleeves	Universal Joints
Bushings	Crankshafts	Forming Dies	Mandrels	Propeller Shafts	Sleeve Shafts	Valve Studs
Cams	Cutter Bodies	Forming Rolls	Master Hobs	Punches	Spindles	Worms
Chain Links	Cylinder Head Studs	Gauges	Molds	Races	Spline Shafts	Wrenches



Increases production of high-strength parts—Clearfield Machine Co., Clearfield, Pa., uses CARILLOY FC steel for the shafts of practically all their heavy-duty clay mixing machinery. In the 7½-ton Maximuller, CARILLOY FC has three important advantages. With a tensile strength of 140,000 to 165,000 psi., it provides a high factor of safety to withstand huge bending and twisting loads. It provides the required hardness of 258-331 Brinell with no need for heat-treating after machining. It makes possible much faster machining with better surface finish than comparable alloy steels.

tempered at the mill

● U-S-S CARILLOY FC steel is *ready for use* when it's delivered. With it you can fabricate gears, shafts, cams, axles, and other high-strength parts without heat-treating them after machining. This free-cutting pre-hardened manganese-chrome-molybdenum steel comes to you already heat-treated within the hardness range of 255 to 375 Brinell and with a tensile strength ranging from 125,000 to 175,000 psi. With CARILLOY FC steel, you save the expense of additional heat-treating and you eliminate rejects caused by distortion and scaling.

ITS BETTER MACHINABILITY PAYS OFF

CARILLOY FC saves you money on machining too. It cuts easily; so you can machine parts faster and, at the same time, get much longer service from your tools than with *any other steel* that has comparable hardness and strength. Shops that use this free-cutting steel report much faster machining with better surface finish. And tools last as much as 3 times longer.

READILY AVAILABLE—REASONABLE IN COST

In spite of its many money-saving advantages, CARILLOY FC costs only slightly more than ordinary through-hardening alloy steels; and you can get it promptly in all standard bar forms and sizes.

Send the coupon for complete information, or contact the nearest U-S-S District Sales Office.

GET COMPLETE INFORMATION

United States Steel
Room 2807-O, 525 William Penn Place
Pittsburgh 30, Pa.

Please send me a free copy of your new booklet, "CARILLOY FC Steel, Free-cutting and Pre-hardened," which contains complete technical information about CARILLOY FC steels.

Name Title
Company
Address
City & State

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

2-2176

UNITED STATES STEEL



**need precision-molded
plaskon alkyd parts in your
hands in a hurry?**

Two requirements most important to purchasers of automotive electrical parts—mass-production to close tolerances and on-schedule delivery—are taken right in stride by PRP. This is well typified in the piece pictured, a switch box for automatic window controls used on top-name cars. PRP produces these parts to exacting specifications with tolerances as low as $\pm .001$ for Detroit Harvester Company's Dura Division. Plaskon Alkyd 420 provides the low shrinkage essential to maintained dimensional stability . . . and to continued smooth operation of the intricate controls. Finished parts are in the customer's hands as fast as needed due to special high speed equipment tailor-made for this type of material.

Our plane is always waiting to speed you here for a discussion of your specific parts problems.

when you look for
plastic moldings, look first to
Plastic Research Products
Urbana, Ohio



New Products

For additional information please use
postage-free reply card on page 65

(Continued from page 134)

cording to the manufacturer. Other safety features include: a large condenser which stores electric power for emergency use; a sensitive limit switch; and electronic tubes charged with mercury vapor.

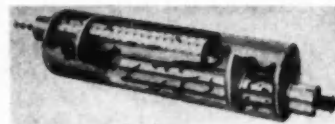


Although the control is presently being manufactured only for defense purposes, units are expected to be available for use in the automotive, aviation, packaging, machine tool, and communications industries about mid-1953. Warner Electric Brake & Clutch Co.

Circle P-11 on page 65 for more data

Truck and Bus Mufflers

Now available is a group of mufflers that are said to reduce exhaust noise and provide increased efficiency. Known as the QT line, the units reportedly muffle exhaust gases by carrying them through expansion, reversing, and silencer chambers.



Heavy gage steel is used in the welded construction of QT mufflers. Units are applicable to gas, propane, butane, or Diesel exhaust systems. Riker Manufacturing Co.

Circle P-12 on page 65 for more data
(Turn to page 144, please)

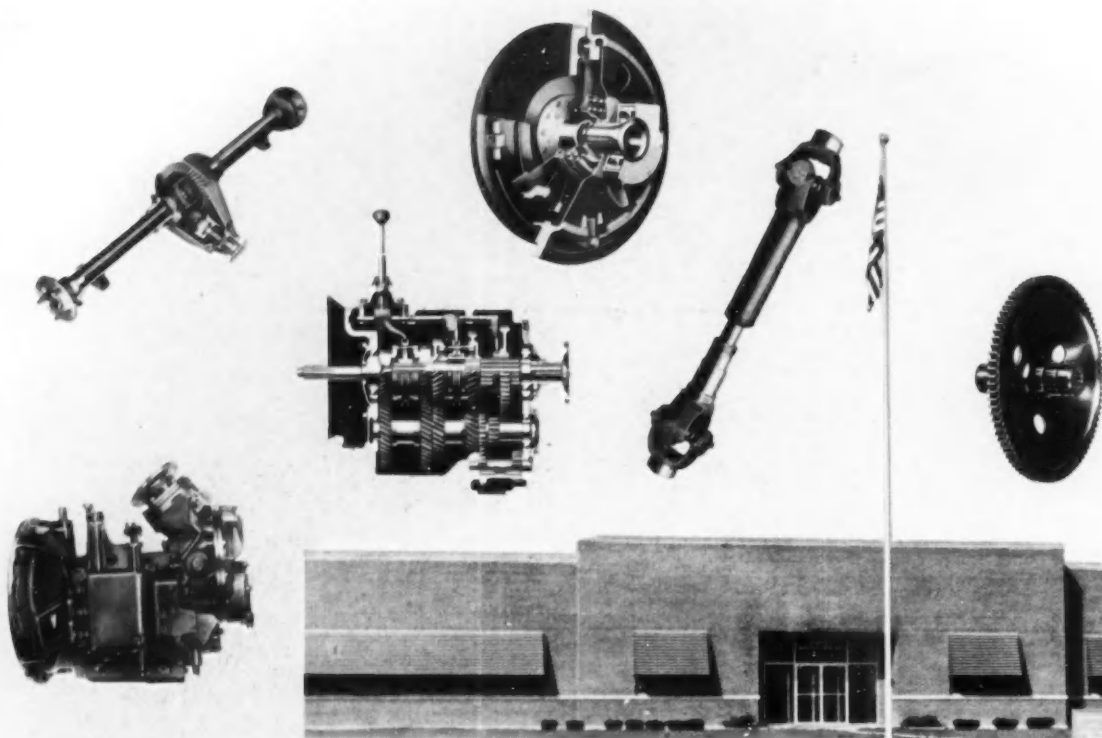


now we are ten

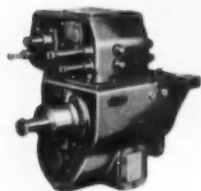
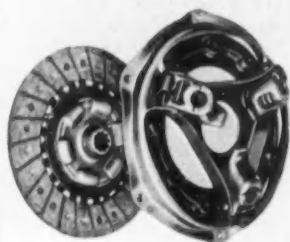
Now there are 10 modern plants in the Dana group of industries serving the automotive and aircraft fields. The addition of two new plants is symbolic of the sound and steady growth of this diversified American corporation. Look to Dana and Spicer for excellence in engineering . . . careful manufacturing . . . and everyday well-managed administration of service.



Spicer



meet marion and fort wayne no. 2



The new Marion Manufacturing Division plant of Dana Corporation is producing the famous Spicer Needle-Bearing Universal Joint and Propeller Shaft assembly so widely used for automobiles, trucks, buses, and tractors.

The new Aircraft Gear Division at Fort Wayne, Indiana, is the second Dana plant to be erected in that city. It is producing highly specialized power transmission units with a background of Spicer precision, which for nearly 50 years has been the

Standard of the Industry

SPICER MANUFACTURING DIVISION of Dana Corporation • TOLEDO 1, OHIO

TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIFE AND AUBURN CLUTCHES
• FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIFE"
GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS •
POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES



ENGINEERING
DANA
MANUFACTURING

We Endorse the Junior Achievement Program

CALENDAR

OF COMING SHOWS AND MEETINGS

- Brussels Automobile & Truck Show, Brussels, Belgium. Jan. 17-28
- Plant Maintenance Show, Public Auditorium, Cleveland, Ohio. Jan. 19-22
- Monte-Carlo Rally, Europe. Jan. 20-27
- 12th Annual Convention, Truck-Trailer Mfg. Association, Edgewater Park, Miss. Jan. 26-28
- 30th International Automobile Show, Pacific Auditorium, Los Angeles, Calif. Jan. 30-Feb. 3
- Western Computer Conference, Hotel Statler, Los Angeles, Calif. Feb. 4-6
- Industrial Ventilation Conference, Mich. State College, E. Lansing, Mich. Feb. 16-19
- National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y. Feb. 24-27
- Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. Feb. 26-Mar. 1
- American Society for Testing Materials, Spring Meeting, Detroit, Mich. Mar. 2-6
- SAE National Passenger Car, Body, and Materials Meeting, Sheraton-Cadillac, Detroit, Mich. Mar. 3-5
- Geneva Automobile & Truck Show, Geneva, Switzerland. Mar. 5-15
- Chicago Automobile Show, International Amphitheater, Chicago, Ill. Mar. 14-22
- National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill. Mar. 16-20
- German Vehicle Show, Frankfurt, Germany. Mar. 19-29
- 27th Automobile Show, Civic Auditorium, San Francisco, Calif. Mar. 21-29
- Eighth Western Metal Congress, Pan-Pacific Auditorium, and Western Metal Congress, Statler Hotel, Los Angeles, Calif. Mar. 23-27
- SAE National Production Meeting, Hotel Statler, Cleveland, O. Mar. 25-27
- International Magnesium Exposition, National Guard Armory, Washington, D. C. Mar. 31-Apr. 2
- 2nd Annual International Motor Sports Show, Grand Central Palace, New York, N. Y. Apr. 4-12
- Auto-Lite Easter Automobile Show, Waldorf-Astoria, New York, N. Y. Apr. 6-11
- SAE National Aeronautic Meeting and Aircraft Engineering Display, Hotel Statler, and Aircraft Production Forum, Hotel Gov. Clinton, New York, N. Y. Apr. 20-23
- Annual Turin Automobile Show, Turin, Italy. Apr. 22-May 3
- British Industries Fair, London and Birmingham, England. Apr. 27-May 3

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. May 18-22

SAE Summer Meeting, The Ambassador and Ritz-Carlton, Atlantic City, N. J. June 7-12

Exposition of Basic Materials for Industry, Grand Central Palace, New York, N. Y. June 15-19

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. June 29-July 3

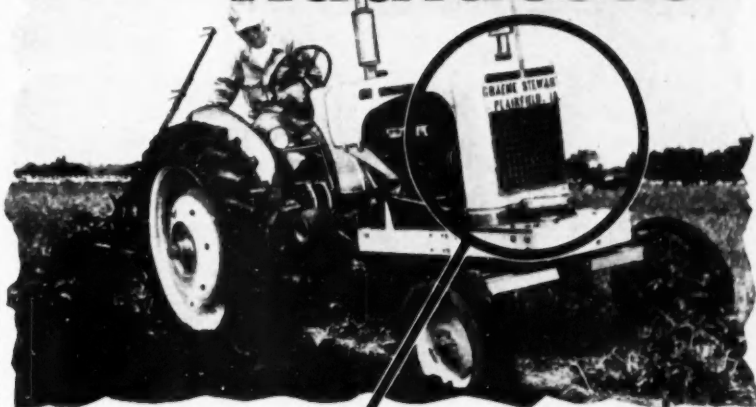
Eighth National Instrument Conference and Exhibit, Chicago, Ill. Sept. 21-25

To Discuss Automation

A discussion dealing with the influence of postwar automotive product design and advanced mass production techniques on the design of machine tools will be presented before the Rockford Industrial Marketers (NIAA) in Rockford, Ill., on Feb. 10, 1953 by Joseph Geschelin, Detroit Editor, AUTOMOTIVE INDUSTRIES. Among other things discussion will center on the role of transfer machines, materials handling methods, and automation.



Radiators



... on this Championship Winning Diesel



THIS Diesel is shown in action... winning the National Level-Land Plowing Championship... where the going is tough, where dependability in operation must be assured. And it's a typical spot in which to find a Yates-American Tractor Radiator... where the service calls for radiators with real structural strength as well as efficient cooling characteristics. That's why many leading tractor manufacturers specify Yates-American Radiators. Write today for full information and descriptive literature.

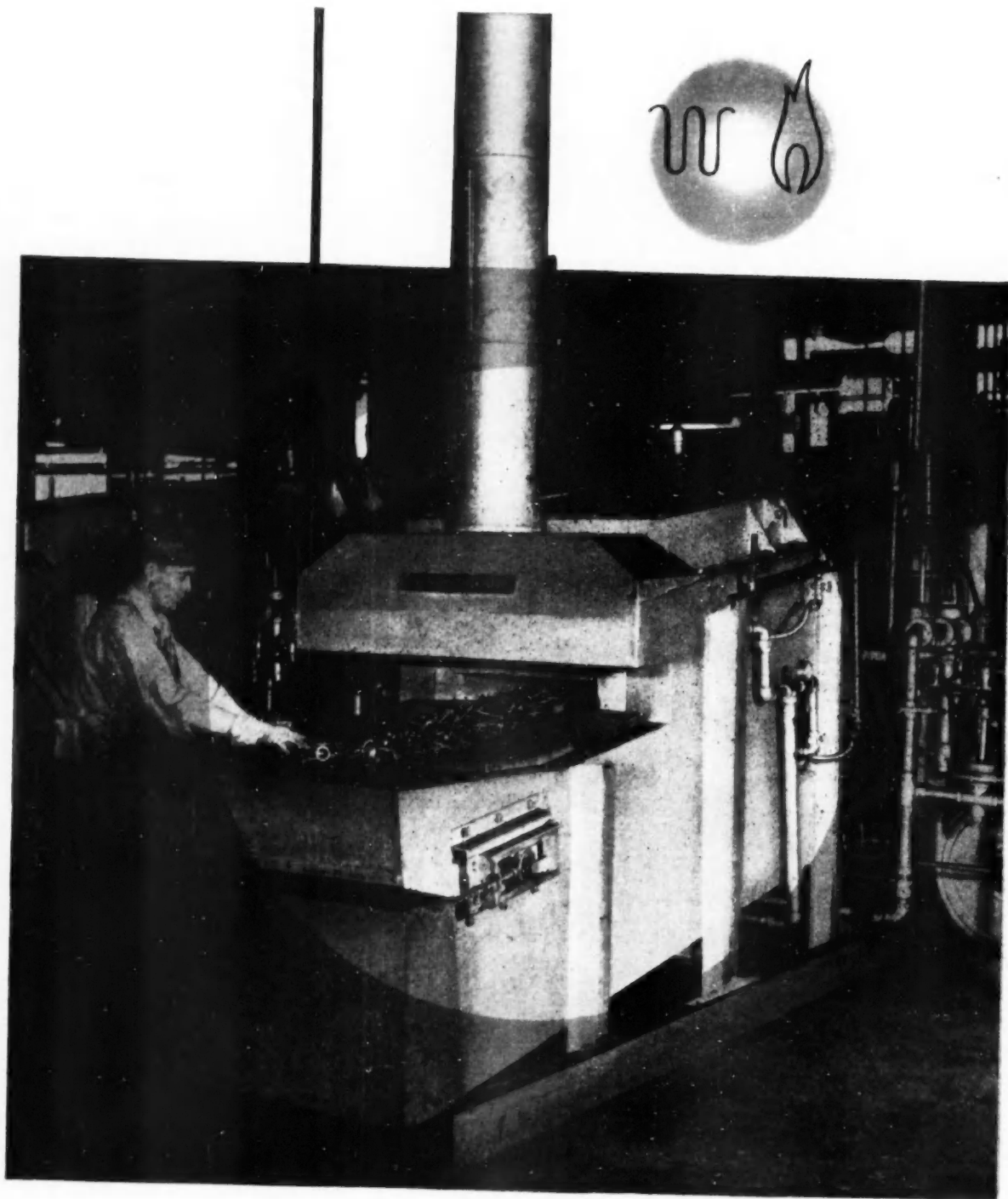
California Representative: E. E. Richter & Son, Emeryville, Cal.



Heat Transfer Products Division

Yates-American
BELLOIT, WISCONSIN

BRANCH OFFICES: CHICAGO, ILLINOIS, HIGH POINT, NORTH CAROLINA, MEMPHIS, TENNESSEE, PORTLAND, OREGON



"Increased production as much as 30% per man hour"

...says Aluminum Industries, Inc.

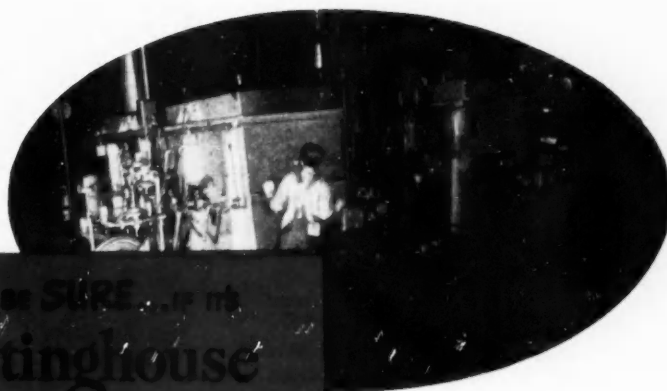
"Since the installation of our new Westinghouse furnace, our maintenance costs have been greatly reduced—with an increase in production of approximately 30% per man-hour. Rejects have been practically nil . . . greatly reducing the factors of bent pieces and production losses that were common with the old-type furnace."

Aluminum Industries, Inc., Cincinnati, Ohio, and Westinghouse engineers co-operated in designing this *gas-fired*, conveyor-type furnace to exact Aluminum Industries requirements. While the furnace was designed, manufactured, and installed primarily for bright-annealing automotive engine valves, it has also been used to bright-harden other company products—proof of its versatility in a specialized industry.

Gas-fired or electric, there's a Westinghouse furnace engineered to meet every heat-treating need. A wide selection of standard units are available, or special designs can be prepared to meet particular requirements. Get the facts from your nearby Westinghouse representative. Ask for the 40-page book B-5459, or write Westinghouse Electric Corporation, Industrial Heating Department, Meadville, Pennsylvania.

J-10384

IF YOUR PRODUCT CALLS FOR
HEAT-TREATING...IT CALLS
FOR A WESTINGHOUSE FURNACE
...GAS OR ELECTRIC



YOU CAN BE SURE...IF IT'S
Westinghouse

HEAT-TREATING FURNACES

A two-finger tapper...
but he knows his wheel types!

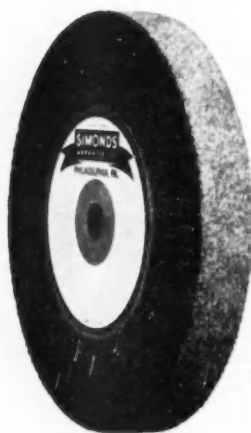


SIMONDS
ABRASIVE CO.
Grinding Wheels

No need to fumble for the right type of grinding wheel.

Simonds Abrasive Company's complete line has everything from giant wheels for production grinding to abrasive grain for polishing... everything you need for finishing, shaping, cutting-off, smoothing or sharpening.

You'll find our free data book mighty helpful. It gives wheel recommendations, lists specifications and suggests methods for safe, productive grinding. We'll gladly send it, together with name of your Simonds distributor. He can save you time, trouble and money. Write.



SIMONDS ABRASIVE CO., PHILADELPHIA, 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

New Products

For additional information please use
postage-free reply card on page 65

(Continued from page 138)

Wire Grips

Recently announced are silver-coated wire grips for general distribution. They are being marketed in five sizes to cover wire sizes from No. 14 wire to No. 1,000,000 cm cable. *Bulldog Electric Products Co.*

Circle P-13 on page 65 for more data

Automatic Dispenser

Recently developed is an automatic dispenser to prevent evaporation of volatile fluids and to save time from removing and replacing bottle stoppers. When the unit is depressed, the fluid pumps up into dispensing dish.

A stainless steel dispenser is said to prevent evaporation or contamination and reduce fire hazard. Six-ounce polyethylene plastic bottle is reportedly unbreakable and inert to chemical action. *Menda Co.*

Circle P-14 on page 65 for more data

Carburetor Kit

Now available is a carburetor service kit that is said to enable cleaning the carburetor right on the engine. A special plastic tubing is attached to a can of Carb Master cleaning fluid and the fitting, on the other end of the tube, is threaded to the carburetor. The fluid pours into the carburetor when the can is inverted.

It is claimed that the fast-action compound will dissolve gums, carbon sludge, lead and varnish, water and dirt. *Rust Master Chemical Co.*

Circle P-15 on page 65 for more data

Truck Tire

Recently introduced is a truck tire known as the Royal Fleetway, that is said to embody radical improvements. One of these is a reduction in groove cracking.

Other features of the new truck tire are reported to be a wider center rib with narrow outer ribs, heat resistant shoulders, and a five-row rib design up to and including 10-in. cross section. *Tire Div., U. S. Rubber Co.*

Circle P-16 on page 65 for more data

(Turn to page 164, please)

PRECISION-MADE PERMITE VALVES

Proven in today's high efficiency engines



Automotive vehicle and engine manufacturers, using Permitem Valves as original equipment, know they can count on valve performance that fully meets today's high efficiency standards. They know that Permitem engineers stand ready to cooperate with them at all times on any troublesome valve problems. They have found that Permitem's ample facilities mean dependable deliveries. We invite you to consult with us on your requirements for valves, pistons and other engine parts.

ALUMINUM INDUSTRIES, Inc. . . . Cincinnati 25, Ohio

Detroit: 809 New Center Building

New York: 9 Rockefeller Plaza

Chicago: 64 E. Jackson Boulevard

ALUMINUM PERMANENT MOLD AND SAND CASTINGS . . . HARDENED, GROUND AND FORGED STEEL PARTS

AUTOMOTIVE INDUSTRIES, January 15, 1953

Heavy Press Program

(Continued from page 45)

the piercer rod, in adequate guide bearings. The piercer cylinder housing, located some 45 ft behind the main cylinder housing, is held in position by four 13½ in. diam columns, on the same centerlines as the main columns, and attached firmly thereto—the two 400-ton piercer pull back cylinders being mounted on this same housing.

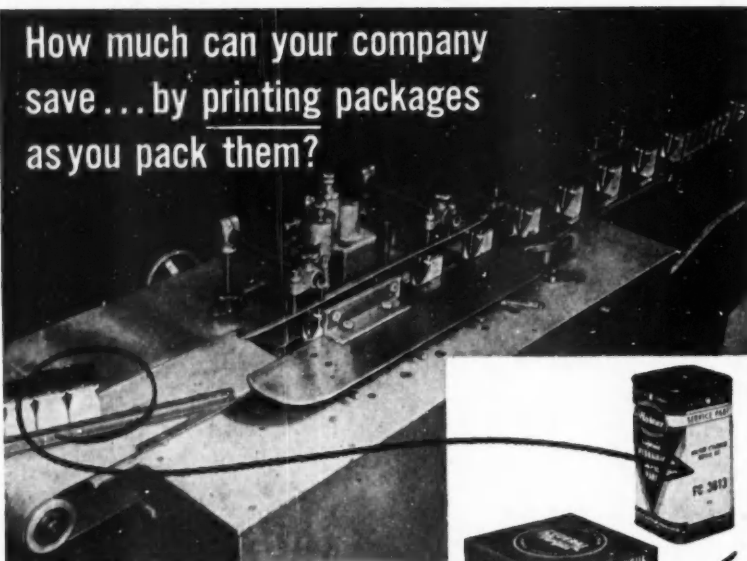
The main crosshead of the press, which carries the pressure stem, and permits the through passage of the piercer rod, is made up of two unit castings, arranged in cruciform fashion, one behind the other—again because of constructional and transportation limitations. The main press platen, that houses the die or tool container, is provided with a large central

hole or passageway, through which the extrusion passes on its way down the runout table, and through which the tool container moves together with the butt end of the extrusion, for separation purposes.

The clear hole through the tool container itself is such that an extrusion circumscribed by an ellipse 48 in. horizontally by 32 in. vertically may properly pass, and the clear passage hole through the platen (through which the tool container passes) is 68 in. diam.

Overall length of the press proper is 140 ft 8 in., not counting the runout table, which adds another 150 ft. The press is 27 ft 1½ in. high (being 17 ft 1½ in. above floor) by 24 ft 6 in. wide. Many of the component castings weigh as much as 425,000 lb, finished weight, and the largest forgings (main columns and main cylinders) reach 200,000 lb. Estimated total weight of the press proper is 3500 tons, or 7,000,000 lb—the auxiliary equipment adding another 4,000,000 lb.

How much can your company save...by printing packages as you pack them?



Do you use completely preprinted packages for each individual part or accessory you make? Or do you use a common package for a variety of products, imprinting or labeling it in a separate operation? Either way you can cut costs considerably and do a more efficient job with a Gottscho MARKOCODER automatic package printing machine.

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Machines to MARK whatever you MAKE

New Techniques for Forging Aircraft Parts

By **G. W. Motherwell, Vice President**
In Charge of Manufacturing

J. R. Douslin, Superintendent
Grafton Plant
and

A. L. RUSTAY, Chief Metallurgist
Wyman-Gordon Company

IN the past year, we have made considerable progress in developing new techniques for the forging of aircraft parts. We are constantly faced with the desire of the aircraft designers for forgings which will require a minimum of machining. This usually means less draft, thinner webs, smaller fillets and radii, and closer tolerances.

Forgings have been designed so that there is practically no machining on one side. The necessary tolerances are absorbed in the finish allowed on the reverse side.

We have learned on these jobs that a 0.25 in. fillet is too small and that a minimum 0.380 in. fillet is needed for reasonable production success. The dies must be sunk, on the un-machined side, to the closest possible dimensions, and the forging delivered to the machine shop must be straightened to the same close tolerances. Such designs call for special consideration in the control of distortion during machining.

(Turn to page 150, please)

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to withstand pressure and reduce friction

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one cutting fluid to do 90% of all jobs

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no skin sores, no rancid odors

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which gives you longer tool life

.... **COOLER WORK**

which can be handled bare-handed

.... **LOWER COSTS**

less than 8¢ a gal., in the machine

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ALL-PURPOSE BASE

—not a more water-soluble oil, but a tool
oil scientifically developed
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ANTISEP doubles tool life for Portland manufacturer —at 1/5 the cost of oil!

Operation consists of forming, threading and tapping stainless steel pipe nipples from 316, 340 and 303 type steel. This company switched from straight oil—costing 42¢ per gallon—to Antisept A.P. Base mixed one part to 30 with water—at a cost of about 8¢ per gallon.

LATEST REPORT— "Getting better finish—tool life doubled—at 1/5 the cost of oil formerly used." Their operators also like Antisept because there's no smoke and work comes off clean.



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Come what may...your plant is prepared for the future...



when it's equipped with versatile LAKE ERIE hydraulic presses

Norris-Thermador Corp. provides
another excellent example

YESTERDAY...

it was bathtubs

TODAY...

it's shell casings

TOMORROW...

it may be another metal
product

BUT...

these hydraulic presses
will be ready for it.

Plant versatility is a mighty important asset...particularly today when products and markets are so prone to change on such short notice. When this versatility is coupled with high production efficiency, as it is with the fast Lake Erie hydraulic presses available today, your plant is equipped to return maximum yield on your investment. No matter what change-over you encounter—military to civilian, or vice versa...a model switch...the introduction of a new product...versatile and efficient Lake Erie Hydraulic Presses will enable you to make the change with a minimum of money, time and retooling. Why not investigate these advantages of Lake Erie Hydraulic Presses? Write or call us. No obligation.



- One of 26 Lake Erie Hydraulic Presses in the Norris-Thermador Corp. plant demonstrates its remarkable versatility. At left—drawing bathtubs, right—heading 105 mm. shell casings.

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In a changing world, this battery of presses at the Norris-Thermador Corp. plant in Los Angeles demonstrates its ability to cope with any production requirement. In addition to bathtubs and shell casings, these presses are also being used to produce compressed gas cylinders for oxygen, propane, CO₂, and acetylene gases. Lake Erie equipment in the Norris-Thermador Corp. plant includes 26 hydraulic presses ranging in capacity from a giant 6,000 ton model to units of 55 tons capacity. Lake Erie Hydraulic Presses are available in a complete range of types and sizes to meet every possible need. Our engineers will be glad to discuss your requirements and submit their recommendations. No obligation on your part. Call on us at any time.



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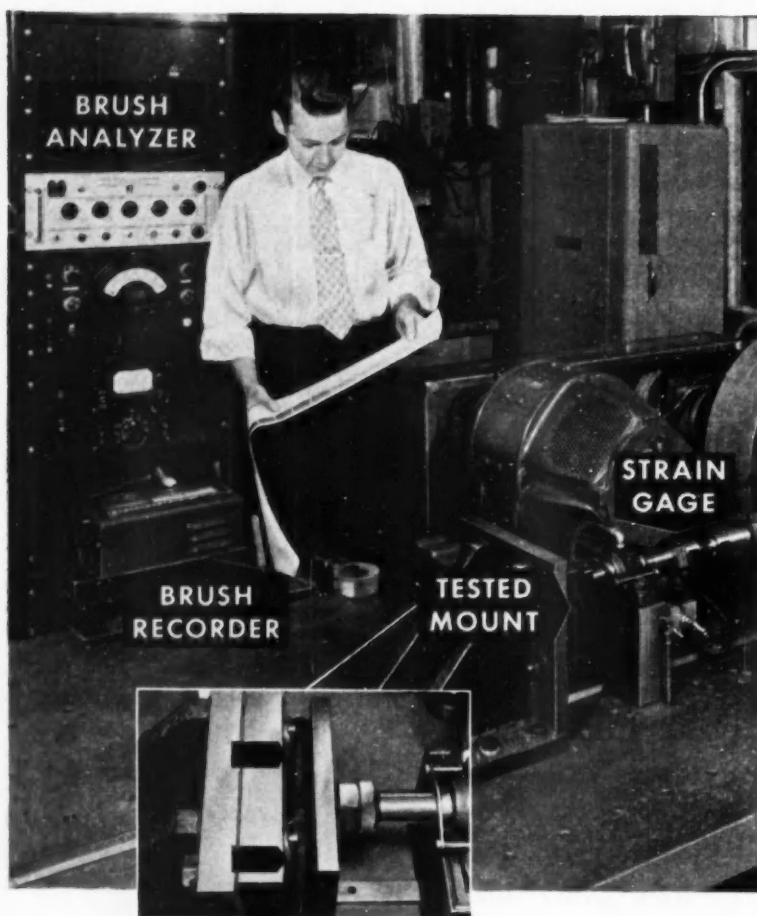
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is an operating unit of
Clevite Corporation

Heavy Press Program

(Continued from page 146)

Progress in Production Technique

Passing now from design to operational features of production, the reduction of frictional forces between the die and the forging has long been recognized as a significant problem. A great part of the available pressure used in flowing stock into the die cavity is expended to overcome friction at the die-metal interface.

A firm specializing in die lubricants has recently produced a modified graphitic lubricant which has proven superior to the older ones. With this, the number of passes required to finish a large forging was materially reduced. Improvement in die closure has been outstanding on a number of difficult jobs, particularly those having a raised parting line where the stock tends to be trapped in the die cavity, or where the area is so great that available pressure is low. On a recent run of a job which commonly required 20 per cent strikeover for fill over 1200 forgings were made without a reject for underfill. This can be ascribed almost entirely to the new lubricant, since neither dies nor method were otherwise changed.

50,000 Ton Forging Press Designed by Loewy

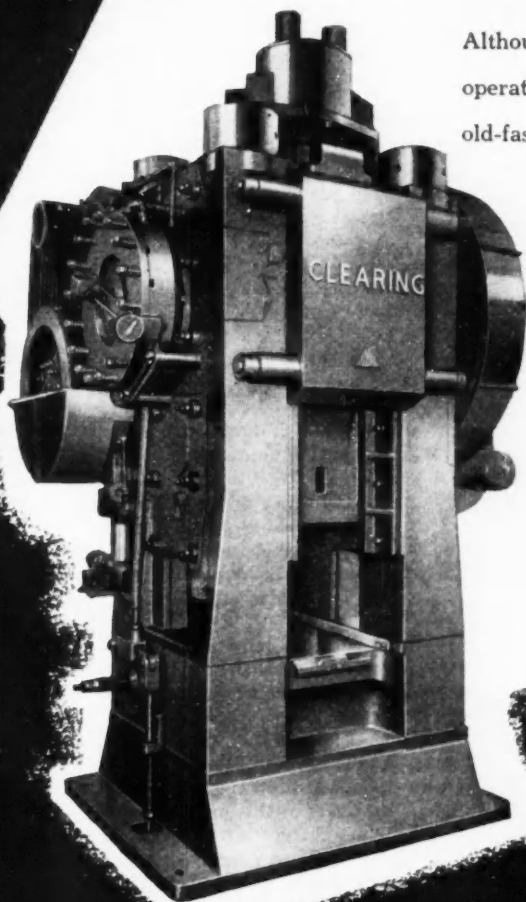
By Fred T. Morrison
Chief Stress Analyst,
Loewy Construction Co.
and

R. G. Sturm,
Director
Auburn Research Foundation

IN designing forging presses which are larger than ever have been built, it was necessary to review the criteria of design in order: (1) To insure that the presses can be made with existing manufacturing facilities. (2) To make the equipment safe in its operation. (3) To produce forgings with the desired dimensional accuracy. (4) Not to tax the transportation facilities in transporting the press components from the shop to the erection site. A review of these criteria resulted in a completely new concept of design which was evolved by the Loewy Construction Co.

This new design is a 50,000 ton capacity pull-down press with nine hydraulic cylinders and six tie-rods or columns. The overall height of the press is approximately 110 ft. All of

FOR BETTER FORGINGS THAT COST LESS



Although they demand less skill and less manual effort from the operator, Clearing forging presses turn out more pieces per hour than old-fashioned methods. The forgings are uniform in size and weight regardless of the human element.

If you're looking for ways to reduce forging costs or increase production without increasing man-hours, Clearing forging presses are your answer. We'll be glad to supply details without obligation to you.

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Cut-away illustrations show why Clearing forging presses give long, dependable service on the tough jobs. Ask for your free copy.



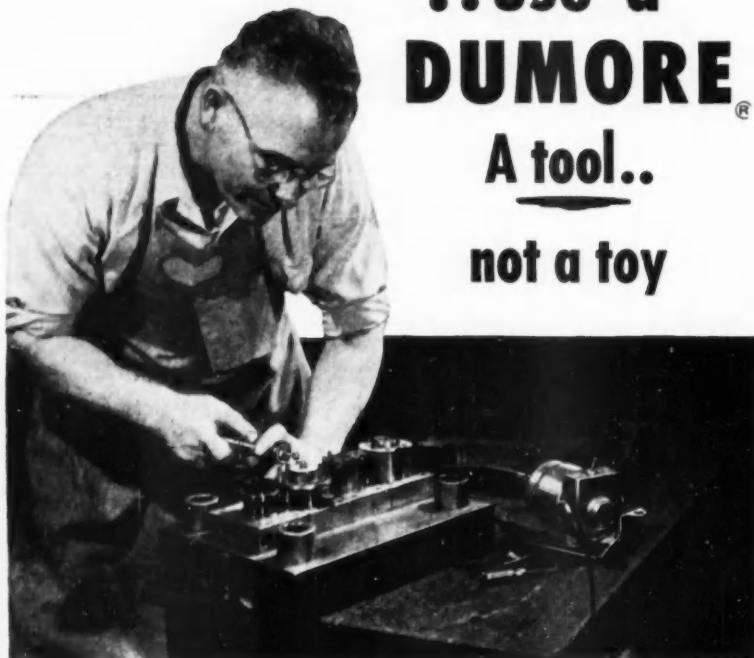
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A tool..
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Don't be misled by extravagant claims for underpowered hobby-type tools. Manufacturers who want tip-top tool performance at all times turn to Dumore Flexible Shaft Tools.


These powerful, high-speed tools slash costs of light hand finishing operations . . . grinding, burring, filing, sanding, lapping, chamfering . . . on ferrous and nonferrous metals as well as wood, plastics, and ceramics.


The light, easily manipulated hand piece permits close, accurate control . . . reduces operator fatigue for steadier production. Their small work-head dimensions make them favorites, too, for multiple drilling setups on close centers. No matter what your job requirement, or your shop budget, Dumore has the *right* flexible shaft tool for you.




DUO-FLEX — 1/15 hp
lo-speed, 500-3,500 RPM.
hi-speed, 3,000-15,000 RPM.

Choose from a complete
range of 3 sizes





UNI-FLEX
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¼ hp — 20,000 RPM.

Furnished with heavy-duty, oil-resistant flexible shafts and Dumore quality, continuous duty rated motors. Choose from three sizes — 1/15 to ¼ hp. Power-Flex puts the power on the bench. Other models can be suspended from any convenient hook.

Ask your nearby industrial distributor for a demonstration of this quality line of Dumore flexible shaft tools or write

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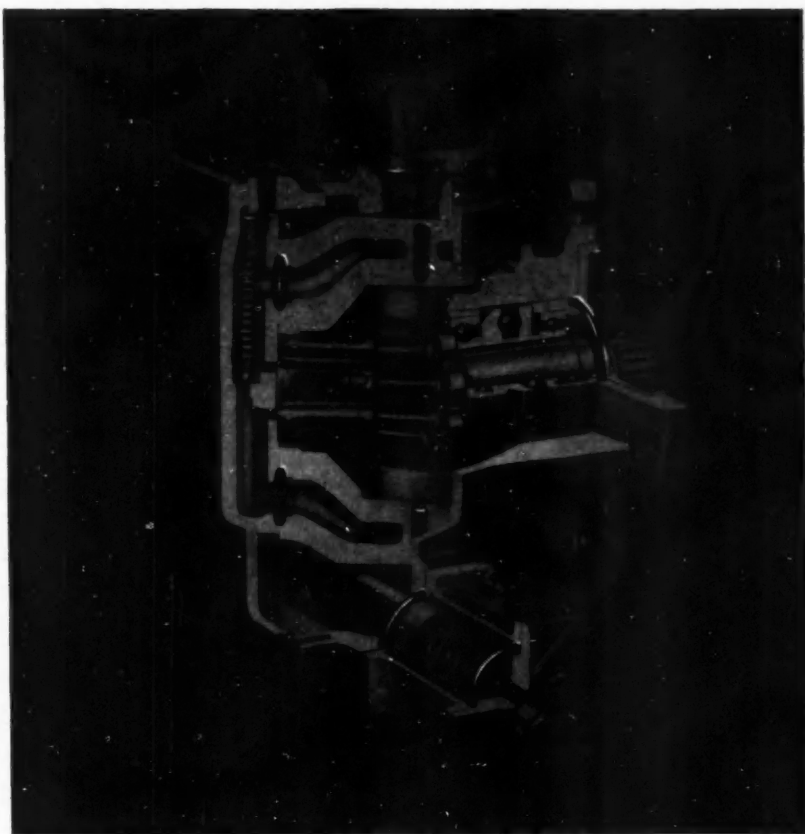
the structure below the lower platen of the press is submerged below the floor or working level, making the superstructure at its highest point approximately 60 ft above floor level. The total weight of the press is approximately 10,000 tons; the moving parts weigh 6000 tons.

The main structural members of this press are composed of composite and transverse forged steel slabs which when assembled and restrained by shrunk tie-rods provide for extremely rigid upper and lower platens, thus minimizing press platen deflections.

Main tie-rods or columns of this press are not of the conventional cylindrical type. Each of the six main tie-rods is rectangular in cross-section and made up in three laminations which are approximately 110 ft long. Since each of the six main tie-rods weighs in the neighborhood of 600,000 lb it is impossible to obtain them in a single steel forging since the latter requires ingots of steel which are far heavier than the largest ingot which can be made with present know-how. By making each main tie-rod in three individual rectangular sections, sounder forgings are obtained, and the problems of fabrication, machining and handling are much improved.

The press is powered by nine hydraulic cylinders which are disposed to balance the hydraulic forces, reduce the bending effects on the structural members of the press, and put them in almost pure compression. The forces are transmitted through a grid-work of plate beams to the lower platen of the press, and through the main tie-rods to the upper entablature. In contradistinction with conventional presses, the entire upper entablature of this press moves with the upper platen. As many as six different pressure stages can be obtained by using various combinations of the nine hydraulic cylinders and by selecting either rated hydraulic pressure of the accumulator system or by using an intensifier arrangement.

To protect the press against excessive eccentric loads which would cause damage to either the main tie-rods or to the press structure itself, a unique type of hydraulic force compensating system has been devised. Its action is entirely automatic and the degree of load compensation is a function of the rotational deflection of the upper entablature of the press when it is subjected to an eccentric loading. The eccentric load compensating system is designed to compensate for a compound eccentricity, coordinate to the center of the press platens. In addition to the compensating system, an



Cutaway view showing O-rings. Illustration courtesy Vickers, Inc.

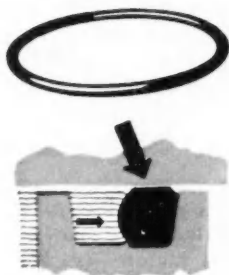
PARKER O-RINGS help pumps set endurance record

Vickers reversible flow 3,000 PSI hydraulic pumps, equipped with PARKER O-rings, recently operated 304,578 pump hours without malfunction for a 12-month period at one airline.

This noteworthy performance—in all sorts of weather—demonstrates the leakproof, long service qualities of PARKER O-rings . . . precision-molded from superior synthetic rubber compounds. Important, too, they provide simplified as well as efficient sealing. Design involves only a small groove to retain the ring. They are economical to use, easy to replace.

PARKER is the one source for *all* standard O-rings for fuel, hydraulic and engine oil services, and for special service O-rings. Ask your PARKER Distributor for Catalog 5100, or write The PARKER Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

THIS IS IT



Cross section drawing of O-ring in groove, sealing under pressure.

Parker

TUBE FITTINGS • VALVES • O-RINGS

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Aero Bolt & Screw Co., Inc.
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Los Angeles 22, Calif.

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Minneapolis 5, Minn.

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Goodyear Supply Co.
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Hydraulic Power Equipment Co.
2316 N. W. Savier St., Portland 10, Ore.

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5239 Brown Ave., St. Louis 15, Mo.

TULSA, Okla.
Metal Goods Corp.
302 North Boston, Tulsa 3, Okla.

WICHITA, Kan.
Standard Products, Inc.
650 E. Gilbert, Wichita 11, Kan.

CANADA
Railway & Power Engineering Corp., Ltd.

automatic strain gage protective system has been incorporated into the press. The strain gages are permanently mounted on the main tie-rods of the press. When pre-selected values of strain in the tie-rods are exceeded, the hydraulic system is automatically unloaded, thus preventing damage to the press.

In designing a machine whose components are as enormous and massive as those required for a 50,000 tons capacity die-forging press, not all design problems are capable of solution on the drafting board. And if they were, a confirmation of such re-

sults is desired in order to avoid costly repair of parts and replacements once the machine is put into operation. The determination of the best shape for load transmitting members to keep to a minimum the effects of stress concentration cannot readily be calculated. Furthermore, the analysis of very complex shapes cannot be approached in a straightforward manner by pure analytic computation. Hence, resort has been made to experimental methods which include two- and three-dimensional photo-elastic studies as well as the testing of scale models.

MEN in the NEWS

(Continued from page 82)

Minneapolis - Hongywell Regulator Co.—Paul B. Wishart, vice-president, has been named to the newly-created position of general manager, and has been elected a director.

Wagner Electric Corp.—J. S. Smith is now director of purchases and production planning. H. S. Garrett is now purchasing agent, and Fred Cheney is manager of inventor requirements.

B. F. Goodrich Co.—Election of William S. Richardson as executive vice-president and a director has been announced.

American Standards Assn.—Newly elected director representing the SAE is George A. Delaney, chief engineer of Pontiac Motor Div. of General Motors Corp.

Dow Chemical Co.—F. P. Streeter is now assistant superintendent of the die casting department.

Ethyl Corp.—Ferd Gillig is head of the new aeronautical section of technical services.

Goodyear Tire & Rubber Co. — Named to fill newly-created positions were R. W. Fitzgerald as sales manager of the tire division, and W. A. Kemmel as manager of the tire division.

J. H. Williams & Co.—C. M. Harrington has been appointed to represent the automotive tools division in the state of Illinois.

Morey Machinery Co.—E. Payson Blanchard has joined the firm as director of sales of the new domestic machinery division.

Townsend Co.—Robert J. Ritchey is now assistant general sales manager.

Pastushin Aviation Corp.—William Patton recently joined as controller.

Bigelow-Liptak Corp. — Harry A. Janke has been promoted to field service engineer, Robert W. Jones is now assistant chief engineer, and Mahlon R. Hunton is chief draftsman.

Piasecki Helicopter Corp.—Don R. Berlin, formerly vice-president and general manager of McDonnell Aircraft Corp., assumes the post of president of Piasecki today. He succeeds C. Hart Miller, who will remain as executive vice-president and general manager.



**LOWER THE
BOOM ON COSTS
SET RIVETS
FAST**

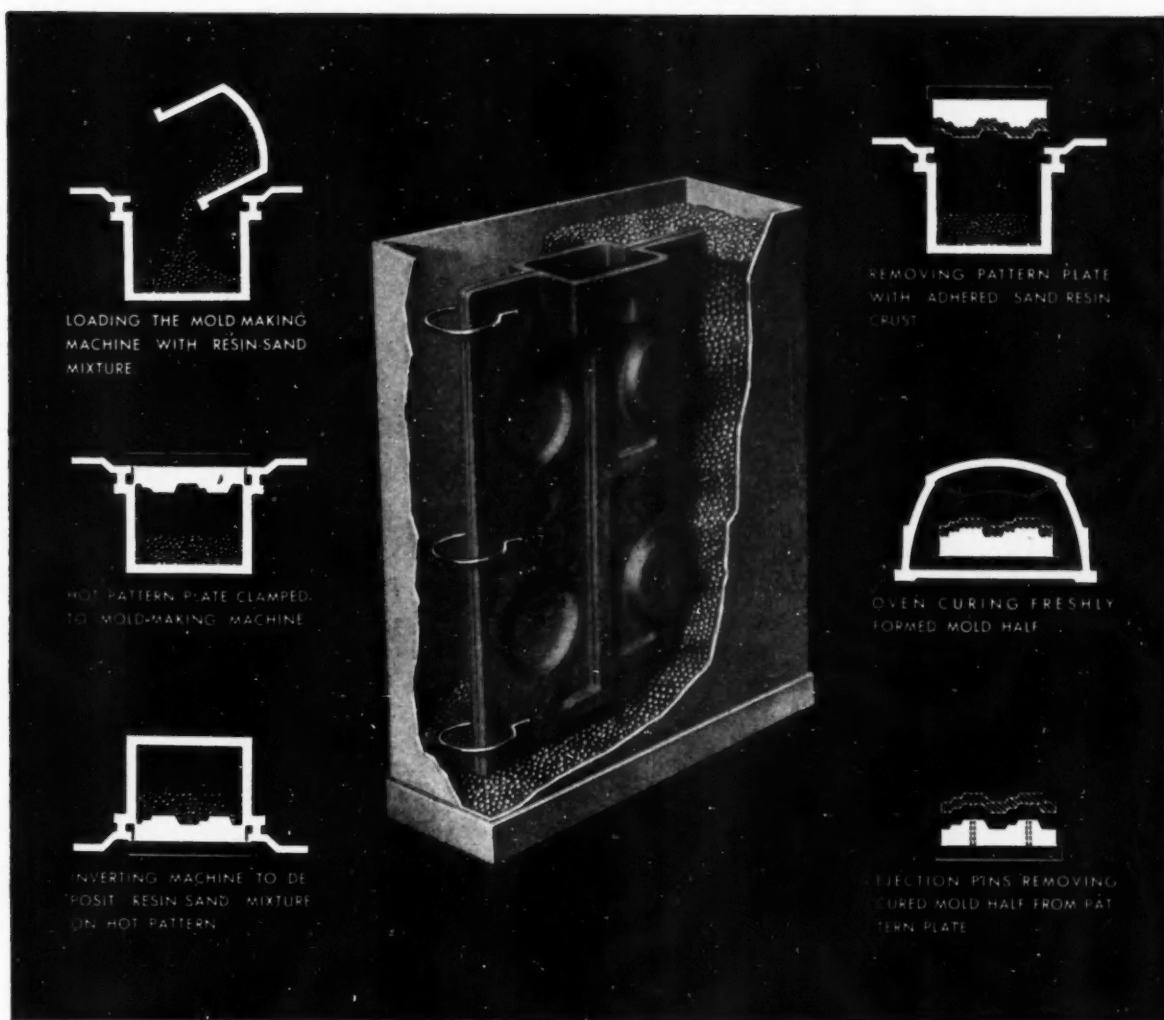
2 at a time with the
Chicago
"214"

• With every press on foot pedal Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches two rivets. 14-inch throat accommodates large assemblies. Handles 9/64" diameter or smaller steel tubular rivets—lengths to 7/8". Quick Change Rotary Type Hoppers and Raceway permit 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to versatility. For help with fastening problem . . . send sample assembly (or a blue print) for free fastening analysis.



FREE CATALOG contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois
Branch Factory: Tyrone, Pa.



SHELL MOLDING and Mass Production

It will pay you to ask your foundry department or supplier about the shell molding process, particularly if your plant is set up for long-run production of ferrous and non-ferrous castings.

Shown here is the "heart" of the process—a thin-shell sand mold bonded with **BAKELITE** Phenolic Resin. The mold is backed with steel shot for reinforcement and heat dissipation as molten metal is poured. Sketches show the steps in mold-making, which can be mechanized.

Here are some advantages that shell molding offers:

- Metal castings have almost pattern-smooth surfaces.
- Pieces are cast to closer finished dimensions—tolerances as close as .003 to .005 inches per inch.
- Higher percentage of sound, uniform castings cuts down on rejects.
- Metal castings require less machining, reducing production costs.

Properly applied to your needs, the shell molding process can speed output, lower manufacturing costs and break production bottlenecks. To learn more about it, consult your foundryman. Or if you have a foundry department, write Dept. OM-59 for booklet C-8, which describes shell molding and the **BAKELITE** Resins developed expressly for it.

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Industry News

(Continued from page 23)

Welding Competition

New rules have been announced for the \$2000 prize competition for "Contributions to the science and art of non-fusion welding, brazing and soldering," by Eutectic Welding Alloys Corp.

Additional emphasis in the 1953 competition has been placed on papers of a more technical nature and the scheduled cash awards have been re-

vised to provide greater reward for entries in that category.

A complete set of contest rules together with hints for contestants, a bibliography, etc., can be obtained by writing to Eutectic Welding Alloys Corp., Dept. P, 172nd St and Northern Blvd., Flushing 58, New York, N. Y.

Brill Recapitalizes

Stockholders of ACF-Brill Motors Co. late last month approved a plan for recapitalization. The plan consists of refinancing \$3 million of notes due May 30, 1953 by issuing a like amount of 5 per cent ten-year con-

vertible sinking fund debentures in exchange therefore; and the paying in cash after the recapitalization becomes effective of a \$925,000 note due Apr. 30, 1953. The new debentures will be convertible at \$10 per share for the first five years of their life and at \$15 per share thereafter.

The recapitalization also includes authorization of 100,000 shares of serial preferred stock (\$50 par value) and increasing the authorized common stock from 1.25 million shares to 2.5 million shares.

First D-E Locomotive Built in Sweden

To the Editor,
AUTOMOTIVE INDUSTRIES:

The following is a tabulation covering the first Diesel electric locomotives [referring to the Necrology item about Dr. Lomonosoff in the Dec. 15, 1952, issue]. Details of this will be found in old issues of the *Railway Gazette* and particularly the Diesel Supplement thereto published in London, England.

In 1913 the first Diesel electric rail car was built in Sweden and this is generally known as the starting point for Diesel electric traction.

The first Diesel electric locomotive was also built in Sweden, this in 1917 (rated 120 hp).

Many experimental models were later built in various countries. For example, the first Diesel electric locomotive placed in service in Russia (1924) was designed by a Mr. Hatchell. In this same year Dr. Lomonosoff's locomotive was completed by MAN in Germany and delivered to the Russian Railways. This was the first Russian Diesel electric locomotive to actually stay in service for several years.

In this same year, 1924, the first American Diesel electric locomotive that gave a good performance record was placed in service. This, however, was a demonstrator and the following year brought out the first Diesel electric locomotive sold in this country (1-300 hp engine). This was built jointly by Ingersoll-Rand, General Electric and American Locomotive.

R. Tom Sawyer
Manager, Research Dept.,
American Locomotive Co.

First Jet Trainer

Canada's first jet trainer, the T-33, is off the Canadair assembly lines ready to be tested and delivered to the Royal Canadian Air Force. A company spokesman said by mid-1953 production of 40 of the aircraft a month is expected. Approximately 500 are scheduled for production.

SUBMERSION UNNECESSARY DISTORTION ELIMINATED

Any part can be tested for leaks without distortion or submersion with the



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- Tests Accurately, Quickly and Safely
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Gentlemen: Please send full details on the WHITTINGTON Vacuum Tester.

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**ELWELL-
PARKER**

Transporting skidloads of automotive stampings on long runs and up a 15 degree grade. For such jobs, this E-P 10,000 lb. capacity low lift platform truck is most economical.

because **ELWELL-PARKER —**

Furnishes ALL types—Elwell-Parker gives *unbiased* advice since it produces both gas and electric trucks. Basic models include high and low lift platform trucks, fork trucks, mobile cranes, tractors.

Builds trucks that cost less to operate—Unequalled design experience cuts maintenance costs and expensive delays due to truck breakdowns.

Offers FREE analysis by materials handling consultants—Resident E-P field men in all principal cities will survey your plant and help you select the most efficient handling system.

Provides service help—E-P Service Engineers make

periodic calls to instruct your drivers and advise your maintenance department about proper servicing.

Get the full story on these *Plus Features* by writing for this General Catalog. The Elwell-Parker Electric Co., 4114 St. Clair Ave., Cleveland 3, Ohio.

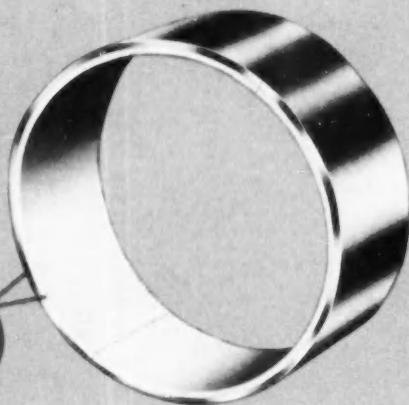


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POWER INDUSTRIAL TRUCKS

Established 1893

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**GETTING FASTER, GREATER RANGE BABBITT COATING FOR
MORE EFFICIENT BEARING MANUFACTURING**



The Wean Babbitt Coating Line enables McQuay-Norris to get a superior babbitt-steel bond at higher speeds. Greater flexibility, too, is a key feature of this new line.

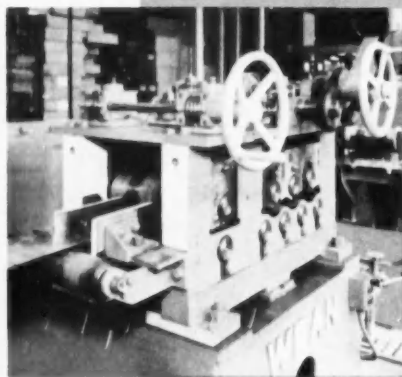
McQuay-Norris, one of the nation's leading manufacturers of bushings and bearings, found it necessary to multiply their production of babbitt coated material. They wanted a babbitt coating line that would cover a wide range of sizes at speeds that would satisfy anticipated production—a precision line that would give them a perfect bond conforming to the high quality standards of the company.

Solution...

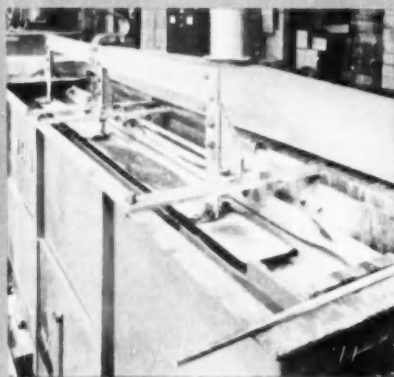
**COMPLETE LINE DESIGNED AND BUILT BY WEAN EQUIPMENT
DELIVERS BETTER QUALITY, WIDEST RANGE AT FASTEST SPEEDS**

After thoroughly checking special machine manufacturers McQuay-Norris authorized the Wean Equipment Corporation to design and build a line that would give them the high quality, flexibility and high production speeds they demanded.

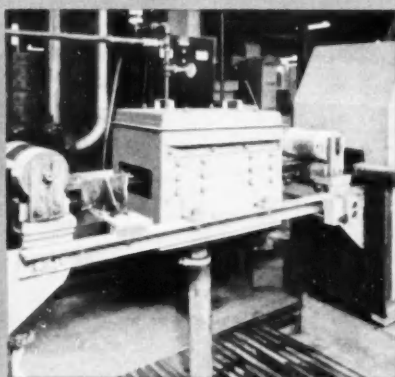
Wean Equipment engineers set to work designing the complete line from pay-off to take-up reels. The finished product is a compact, high-speed line that will process material ranging from .036" x 2 1/2" to .125" x 7" at speeds up to 50 F.P.M.



Strip moves from 1. Leveler to ...



2. Alkaline Electrolytic Cleaner to ...



3. Fresh Water Spray Rinse to ...

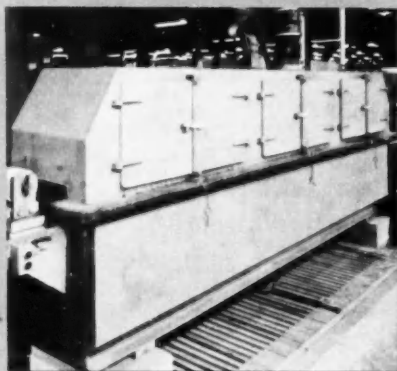
DESIGNING AND BUILDING TOMORROW'S METAL WORKING

Requiring minimum floor space, the Wean line levels, cleans, pickles, tins, continuously casts a babbitt coating, precision machines to desired thickness recovering excess material and neatly coils coated material ready for fabrication.

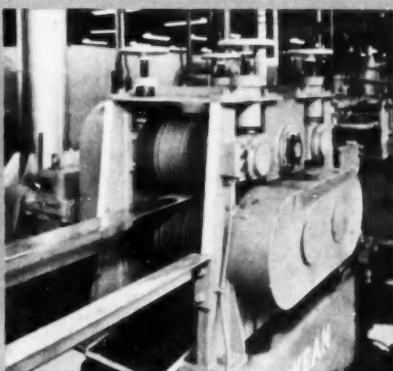
Those who have watched the McQuay Line perform are impressed with its efficiency—the simplicity of operation and ease of maintenance. The line enables McQuay-Norris to produce bearings and bushings of precision quality at unparalleled high speeds. Changeover to differ-

ent gauges, widths and coating thicknesses requires a minimum of time and labor.

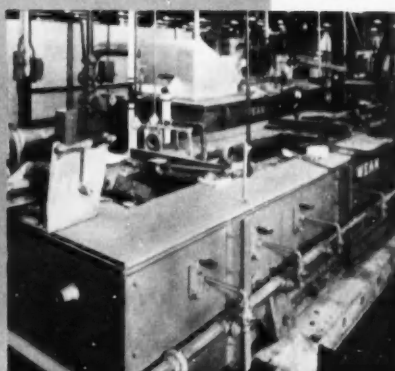
This is another example of Wean Equipment versatility and engineering skill. It is another reason why — when you're looking for the finest in special machinery, continuous lines, slitting, shearing and leveling equipment or wire machinery — you should think first of Wean — designers and builders of tomorrow's machinery today.



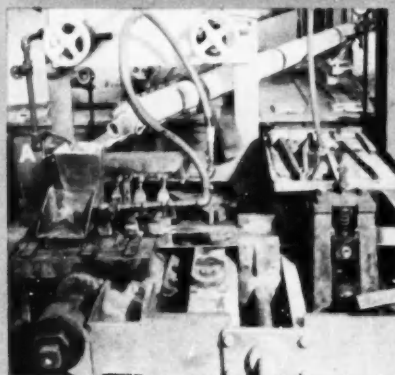
4. Electrolytic Pickle to ...



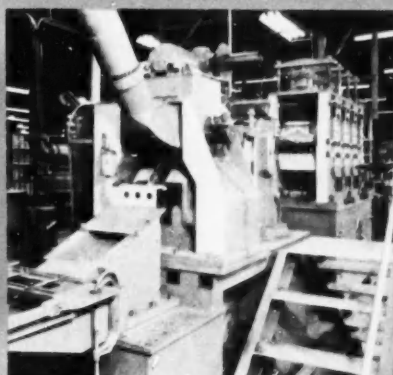
5. Intermediate Pull Rolls to ...



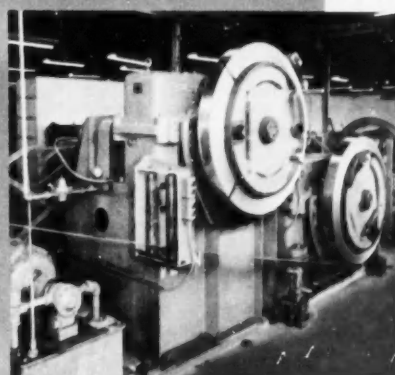
6. Tinning and Pre-heating Furnace to ...



7. Babbitt Casting Head to ...



8. Milling, Skiving and Main Pull Rolls to ...



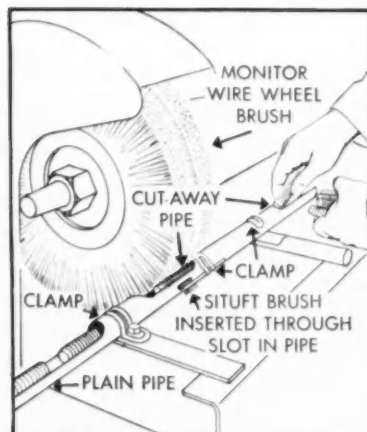
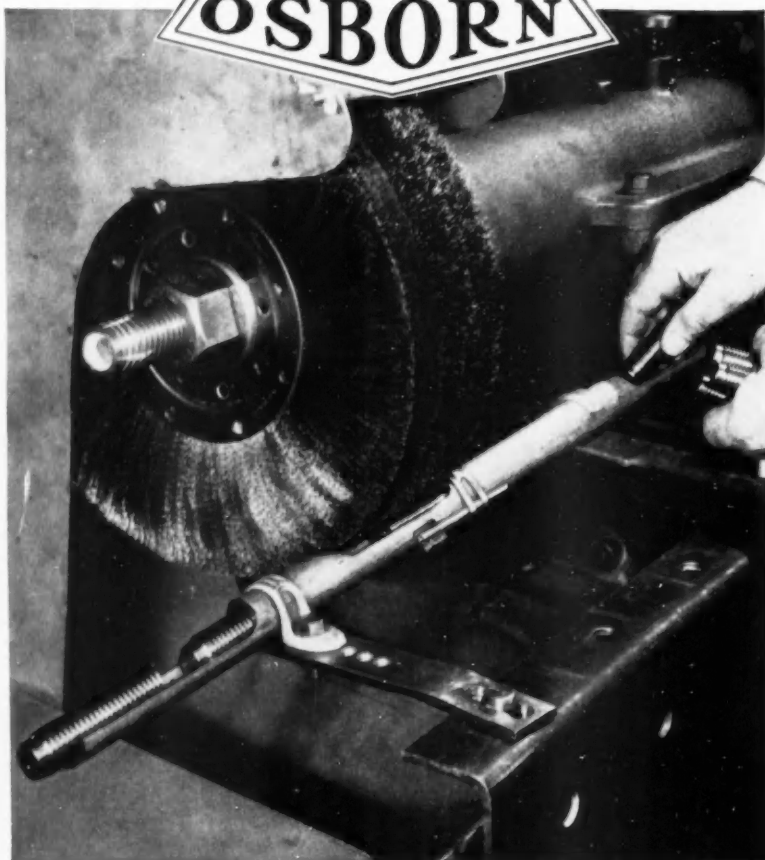
9. Double Head Recoller.

MACHINERY TODAY IS THE BUSINESS OF THE



Wean
EQUIPMENT CORPORATION
Cleveland, Ohio

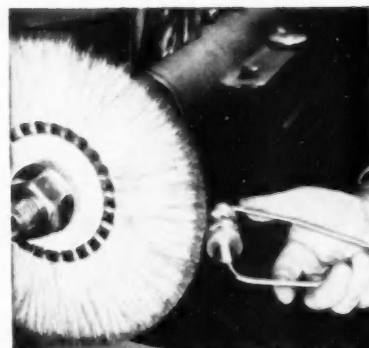
OSBORN



THE FIXTURE. This sketch shows how to make pipe fixture for deburring and polishing small parts, threaded or smooth. Can be made of steel, fiber or plastic tubing.



TYPICAL PARTS. Set screws, pins, pieces of tubing and other parts such as these can be cleaned and finished in the pipe fixture or in the forceps shown below.



ANOTHER SIMPLE APPROACH. For small parts such as bushings, a simple forcep fixture can be devised to hold parts for power brushing. This one is made of wire.

How to find an 800% production increase in a piece of pipe

You can save manpower and money in countless ways when you tap the idea resources of power brushing. For example:

It took 18 seconds to clean the threads of the $2\frac{1}{2} \times \frac{1}{4}$ -inch set screws shown above. Time was cut to 2 seconds with Osborn Power Brushing by devising the simple pipe fixture shown. The operator feeds the screws in one end of the pipe and an Osborn brush makes contact with the work at a slot cut in the pipe, spinning and cleaning the threads uniformly. A little stationary wire brush, inserted as shown through the pipe, controls rotation and traverse of the work.

Have your **Osborn Brushing Analyst** help you develop and apply output-increasing ideas to *your* cleaning and finishing operations. Call now or write *The Osborn Manufacturing Company, Dept. E-1, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS

Industry News

(Continued from page 156)

Polk Estimates Vehicles in Use at 48.2 Million

Statistics on number of cars in use compiled by R. L. Polk & Co. fall considerably under Bureau of Public Roads estimates. According to Polk's statistics, 39,769,741 passenger cars were registered in the United States as of last July 1. The figure for trucks is 8,419,855 for a total of 48,189,596 cars and trucks, an increase of 512,295 from July 1, 1951. Passenger cars increased 2.7 per cent and trucks 4.1 per cent. PRA estimates are considerably higher, showing a total of 53,363,000 vehicles in use at the end of December, including 43,894,000 cars and 9,469,000 trucks and buses. Admittedly the PRA figures show vehicle population at the end of the year, a six months later date, and include publicly owned vehicles and buses. However, the difference of more than five million between the two estimates can hardly be accounted for by these factors and apparently stems from a different evaluation of the scrappage factor and possibly more elimination of duplications in Polk tabulations. Polk also estimates that 465,000 commercial trailers and 249,000 motorcycles were registered as of last July 1.

Largest ASI Show

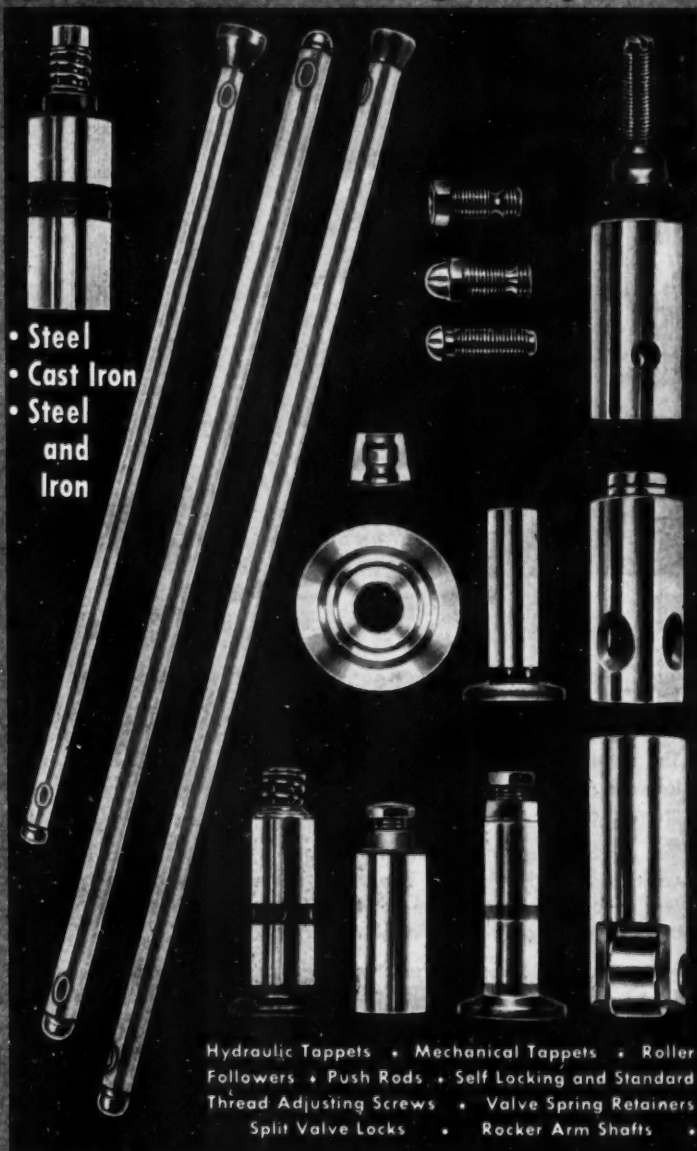
New developments in the automotive service industry attracted more than 15,000 manufacturers and wholesalers to the bi-annual A.S.I. show in Atlantic City, N. J., early in December. Described as the largest of its kind, the show drew more than 500 exhibitors with displays of replacement parts, tools, equipment accessories and supplies.

Attendance at the national show was drawn principally from the East and Middle West and plans for a booth-type show late in 1953 were widely discussed.

Prior to the show opening, Charles A. Kalus, director of sales, Maremont Automotive Products, Inc., was elected president of the National Standard Parts Assn., Dudley L. Millikin, sales manager, Rust Master Chemical Co., became president of the Motor & Equipment Manufacturers Assn., and Ray Graff, Graff Motor Supply Co., was chosen president of the Motor & Equipment Wholesalers Assn.

(Turn to page 162, please)

"CHICAGO" precision valve gear parts



- Steel
- Cast Iron
- Steel and Iron

Hydraulic Tappets • Mechanical Tappets • Roller Followers • Push Rods • Self Locking and Standard Thread Adjusting Screws • Valve Spring Retainers • Split Valve Locks • Rocker Arm Shafts •

Connecting Rod Bolts.....Hydraulic Cylinder Pistons
Cylinder Head Studs.....Cylinder Head Cap Screws
Main Bearing Studs.....Main Bearing Cap Screws
Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
Oil Pump to Distributor Shafts.....Remote Control Levers
Automatic Transmission Valves.....Water Pump Shafts

Special Screw Machine Parts 1/16" to 5" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products

**The CHICAGO
SCREW COMPANY**
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872



... HAVE ADVANTAGES IF YOU ARE PRODUCING MILITARY SPARE PARTS OR SUPPLIES

The advantages to you include lower packaging costs in that less labor is required on the assembly line and, in most instances, increased output results.

The advantages to the military include a continuous barrier for each completed package. This offers maximum protection against mechanical failure in service handling, and with a minimum of error due to the human element in packaging operations.

Spare parts and supplies packaged in cans made under MIL-C-12147 and MIL-C-5405 meet all the requirements of Method 1A and Method 1C, Unit Packaging, under MIL-P-116A. This packaging is approved and currently in active use by most of the technical branches of the service.

In addition, there is a growing acceptance for the use of these containers in many civilian applications.

Write or call us regarding any packaging problems confronting you at this time.

The CLEVELAND CONTAINER Co.

6201 BARBERTON AVE. CLEVELAND 2, OHIO

- All-Fibre Cans • Combination Metal and Paper Cans
- Spirally Wound Tubes and Cores for all Purposes

PLANTS AND SALES OFFICES: Cleveland, Detroit, Chicago, Plymouth, Wisc., Jamesburg, N. J., Ogdensburg, N. Y. • ABRASIVE DIVISION at Cleveland
SALES OFFICES: Grand Central Terminal Bldg., New York City; Washington Gas Light Bldg., Washington, D. C.; West Hartford, Conn.; Rochester, N. Y.; Cleveland Container Canada, Ltd., Prescott, Ontario • Offices in Toronto and Montreal



Industry News

(Continued from page 161)

Fingerprint Remover Discussed at Conference

The preservation and packaging of material to guard against damage by corrosion was the topic of a well attended Joint Industry Conference, sponsored by General Motors Corp. and R. M. Hollingshead Corp., held in Camden, N. J., recently. One of the most interesting subjects dealt with peelable plastics.

M. R. Gatto, of Hollingshead, presented a timely paper on a new cold dip, curing type plastic compound. He stated that the coating is a specially formulated plastisol composition. This plastisol is readily converted into a tough coating by subjecting it to a temperature of approximately 300 F. On cooling to room temperature the optimum properties of the material are obtained. It is claimed that correctly formulated plastisols possess uniform and stable viscosity for extended periods of time under 85 F.

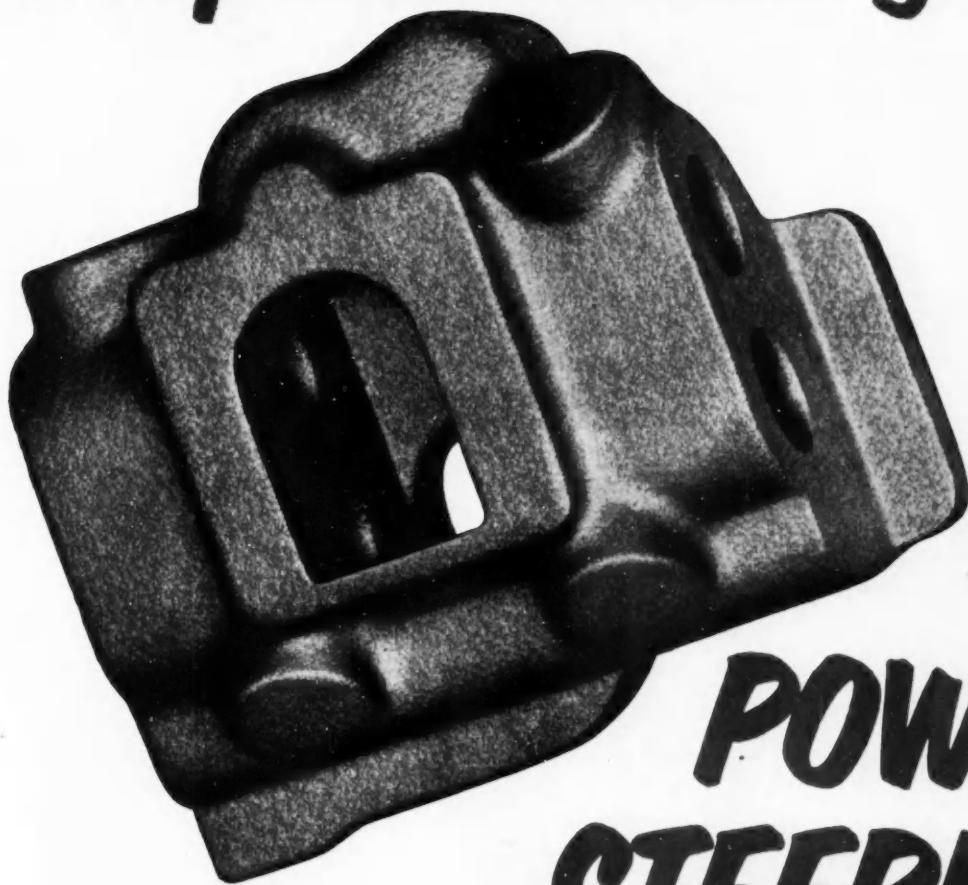
Discussing fingerprint remover compounds, Lt. O. R. Cunningham, Chemical Laboratory, Wright-Patterson Air Force Base, O., stated the synthetic methanol is used as a control or standard in evaluating materials to be supplied under the military specification for ability to remove fingerprint or polar type contaminants. He went on to say that there appears to be a great potential use for fingerprint removers in preservation accomplished with vapor phase inhibitors. Another field where the use of removers may prove rewarding is that of the preservation of bearings, according to Lt. Cunningham.

The chairman of the two-day meeting was L. A. Danse, General Motors Corp. One of the features of the affair was a tour through the laboratory of R. M. Hollingshead Corp.

Flxible to Suspend Ambulance Output

Because of an expanded bus manufacturing program and a mounting backlog of defense orders, Flxible Co. will suspend production of ambulances and funeral cars this year. Recently, Flxible concluded an agreement with Twin Coach Co. under which Flxible is to manufacture and sell Twin Coach city-type buses. The company also has defense production contracts, particularly in the aircraft field, and these are expected to show substantial increases soon.

Eaton Permanent Mold Gray Iron Castings—



for
**POWER
STEERING**



Send for your free copy of the 32-page illustrated booklet: "The Eaton Permanent Mold Foundry." It tells the story of Permanent Mold Castings and takes you on a picture-tour of the Eaton Foundry at Vassar, Michigan.

EATON MANUFACTURING COMPANY

General Offices: CLEVELAND, OHIO

FOUNDRY DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

New Products

For additional information please use
postage-free reply card on page 65

(Continued from page 144)

Truck Stoplights

Recently marketed are three stoplights for light and heavy commercial vehicles

No. 5288 is a 7 5/16-in. diam

bracket-type stoplight of heavy-gage steel and is designed for mounting under the truck body. It holds a seven-in. convex red lens of fired glass with baked-in black "Stop" panel. The entire lamp is said to be waterproof, dustproof, and vibration-proof.

Nos. 289 and 299 4 1/2-in. stoplights are designed for light trucks, trailers, or as added warning lights on big equipment. Both have 21 cp bulbs illuminating 12 sq in. of lens.

The No. 289 bracket-mounting type is said to afford easy installation with sturdy compactness. No. 299

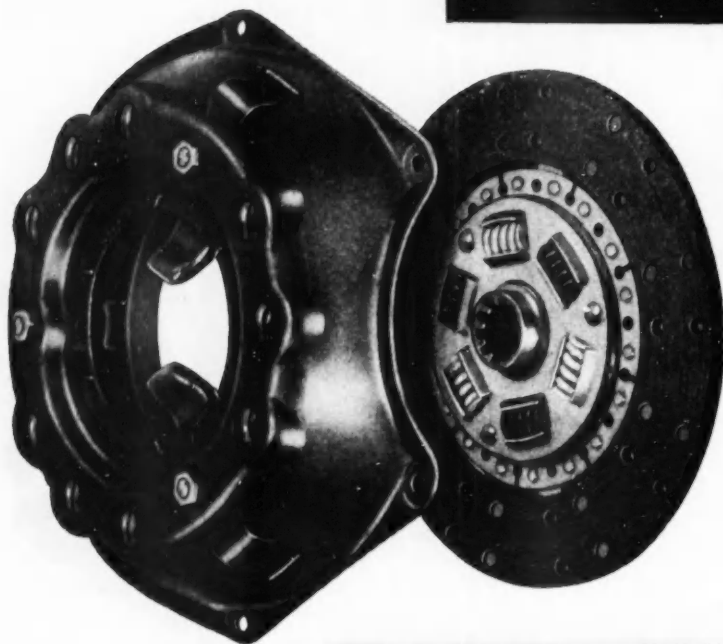


flush-mounting type is also planned for various types of use. Auto Lamp Manufacturing Co.

Circle P-17 on page 65 for more data

Engineered by Borg & Beck...

... means
MAXIMUM
PERFORMANCE
MINIMUM
MAINTENANCE!



You can depend on

BORG & BECK

CLUTCHES... FOR THAT VITAL SPOT WHERE
POWER TAKES HOLD OF THE LOAD!



BORG & BECK DIVISION • BORG-WARNER CORPORATION
Chicago 38, Illinois

Brake Drum Gage

Now available is a brake drum gage that is said to be capable of checking the serviceability of drums, either unmounted or mounted on wheels or on any brake drum lathe. Identified as the Model B-240 Brake Drum-Check-R, it has two interchangeable gage bars which provide universal range for measuring passenger car and truck drums six in. to 18 1/4 in. in diameter.



A chief advantage claimed for the gage is its offset construction permitting accurate measurement of late model drums with raised hubs, as well as measurement of drums while mounted on the drum lathe. The gage dial is graduated from .010 in. minus to .250 in. oversize (1/4 in.)

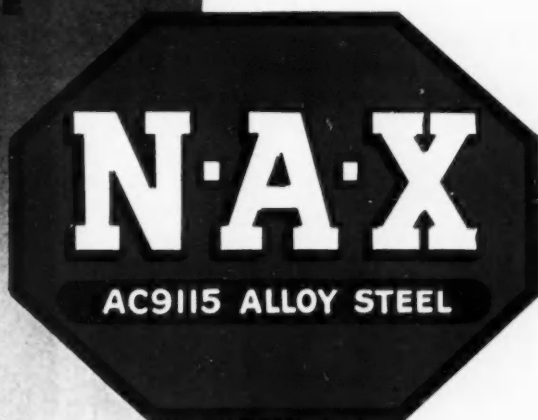
The two gage bars are calibrated to standard drum sizes and reportedly permit changing the gage from passenger car to truck use in less than 10 sec. Barrett Equipment Co.

Circle P-18 on page 65 for more data

(Turn to page 168, please)

a proven steel

FOR GAS TURBINE
STRUCTURES



The production of gas turbines for jet aircraft engines and other uses is dependent upon metals which at both high and low temperatures have good strength, toughness, and stability before and after welding. N-A-X AC9115 ALLOY STEEL possesses these properties and is applicable to those parts where the operating temperatures range from -70° F. up to about $+1000^{\circ}$ F., and where suitable coatings are used for surface protection against normal and hot corrosion.

N-A-X AC9115 ALLOY STEEL has outstanding cold forming and welding characteristics and conserves critical alloys in its composition.

For more information about N-A-X AC9115 ALLOY STEEL, send for our new booklet.

A New Booklet
For Design Engineers



Write for this 16-page booklet on N-A-X AC9115 ALLOY STEEL. It describes the properties and characteristics of this material and offers information on its fabricating and welding properties.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division

Warren, Detroit 29, Michigan

NATIONAL STEEL

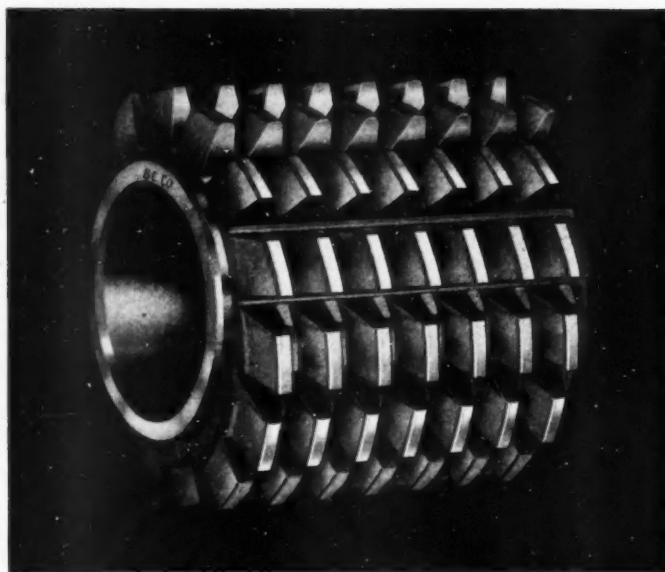


CORPORATION

Makers of the famous



CLASS AA HOBS FOR THE FINEST IN GEAR ACCURACY



CONTROL LIMITS WITHIN CLOSE RANGE

Although the hob is not the only factor affecting the accuracy of gears, it does have an important effect, particularly upon the profile of the gear. Barber-Colman makes hobs to all the standard tolerances to satisfy any of your gear requirements.

In addition to the standard classes, Barber-Colman has developed the Class AA hob which is made to consistently closer tolerances than any other hobs. This class of hob has proved itself in actual production for many years and is recommended for the utmost in accuracy if other conditions warrant the use of such a fine tool.

Within established standard hob tolerances, some hobs naturally approach high or low limits to a greater degree than others. On certain classes of work, it may be necessary to select from your tool crib the hobs which cut the most accurate gears. In such cases when you require hobs of the finest and most consistent accuracy, we suggest your consideration of Class AA hobs.

In many cases, your gear requirements may not demand this degree of precision control. But whatever your hobbing problems may be, Barber-Colman Engineers will be glad to help you solve them.



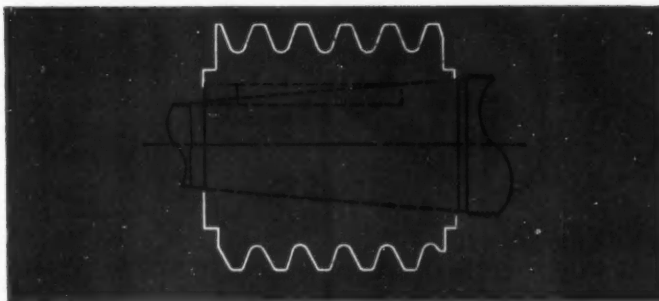
D E S I G N E R S O F S T A N D A R D A N D S P E C I A L

TAPER HOLE HOBBS AID ACCURACY CONTROL

Runout can destroy most of the inherent accuracy of a hob. As a further step in accuracy control, Barber-Colman Hob Engineers have developed hobs with taper bores. They are recommended for all Class AA Hobs, and for all hobbing jobs where accuracy is paramount.

Where high accuracy requirements are demanded it is much easier to true hobs with the taper bore mounting. Compared with the sliding contact on straight hole hobs, the taper provides metal-to-metal contact, eliminating the possibility of an increase in runout during the cutting operation. Also, much time is saved by the operator because the hob will run as true as the spindle.

TAPER BORES PROVIDE
TRUE CENTERING ACTION



Production-line accuracy in all metal cutting operations is constantly approaching closer limits. Gear hobbing is perhaps the outstanding example. When you have gear tooth problems be sure to ask Barber-Colman Hobbing Engineers to work with you. One of the longest experiences in gear cutting is available to you without cost or obligation.



Write for a copy of Hobbing Notes — "Hobbing Accurate Gears"

HOBBS • CUTTERS • REAMERS
HOBBIING MACHINES
HOB SHARPENING MACHINES



Barber-Colman Company

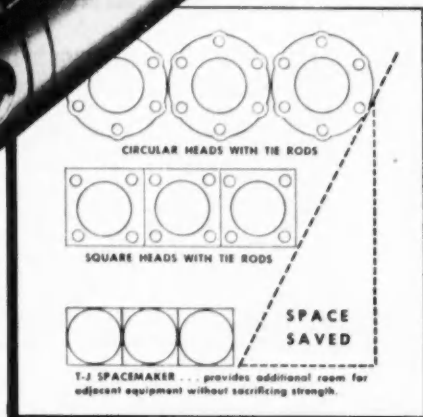
GENERAL OFFICES AND PLANT, 701 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

M E T A L C U T T I N G T O O L S S I N C E 1 9 0 8

NEW **(T-J)** Spacemaker AIR CYLINDERS



- SAVES UP TO 40% SPACE WITH NEW STREAMLINED DESIGN.
- SUPER STRENGTH . . . EXTRA HIGH SAFETY FACTOR.
- SOLID STEEL HEADS.
- HEAVY WALL, PRECISION HONED, HARD CHROME PLATED SEAMLESS STEEL BODY.
- LEAKPROOF CYLINDER HEAD TO BODY CONSTRUCTION.
- RELATIVE PORT POSITIONS MAY BE ROTATED WITHOUT DISASSEMBLY OF CYLINDER AND LOCKED IN DESIRED POSITION.
- HEAVY DUTY, HI-TENSILE, HARD CHROME PLATED PISTON ROD.



Streamlined construction of the new T-J Cylinders eliminates tie rods . . . reduces head size . . . and saves up to 40% in mounting space! In addition, a new high in strength is achieved with solid steel heads and heavy wall seamless steel body . . . leakproof construction . . . extra high safety factor.

Cylinder walls are precision honed and hard chrome plated for long-life efficiency. Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . both cushioned and non-cushioned . . . for wide range of pushing, pulling, lifting, clamping or control jobs. T-J dependability. Fast delivery to meet rush requirements. Write for bulletin 8152. The Tomkins-Johnson Co., Jackson, Mich.

Many More Advanced Features!

**37 YEARS
EXPERIENCE**

**(T-J)
TOMKINS-JOHNSON**

RIVETORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS

New Products

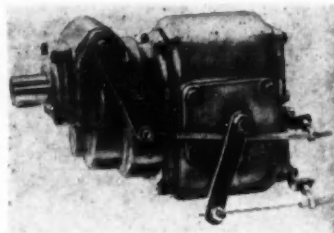
For additional information please use
postage-free reply card on page 65

(Continued from page 164)

Power Take-Off for Trucks

Recently announced is a multiple-speed power take-off with two speeds forward and two speeds in reverse. Designed to meet the needs of diversified power accessory equipment, the unit is said to be suitable for use on all makes of trucks.

Gears and shafts are of alloy steel, while helical gears reportedly give minimum noise with maximum load capacity. Bearings are the heavy-duty tapered roller type. Idler gear is supported on cageless roller bearings.



Shafts can be mounted above or below center front or rear. The unit is available with the following shaft sizes: 13/16 in., one in., 1 1/4 in., and 1 1/2 in. Chelsea Products, Inc.

Circle P-19 on page 65 for more data

Lubrication Units

Recently marketed are stationary lubrication units, designed primarily for use in service stations and garages. They are said to be engineered to conserve floor space and yet provide excellent service facilities.

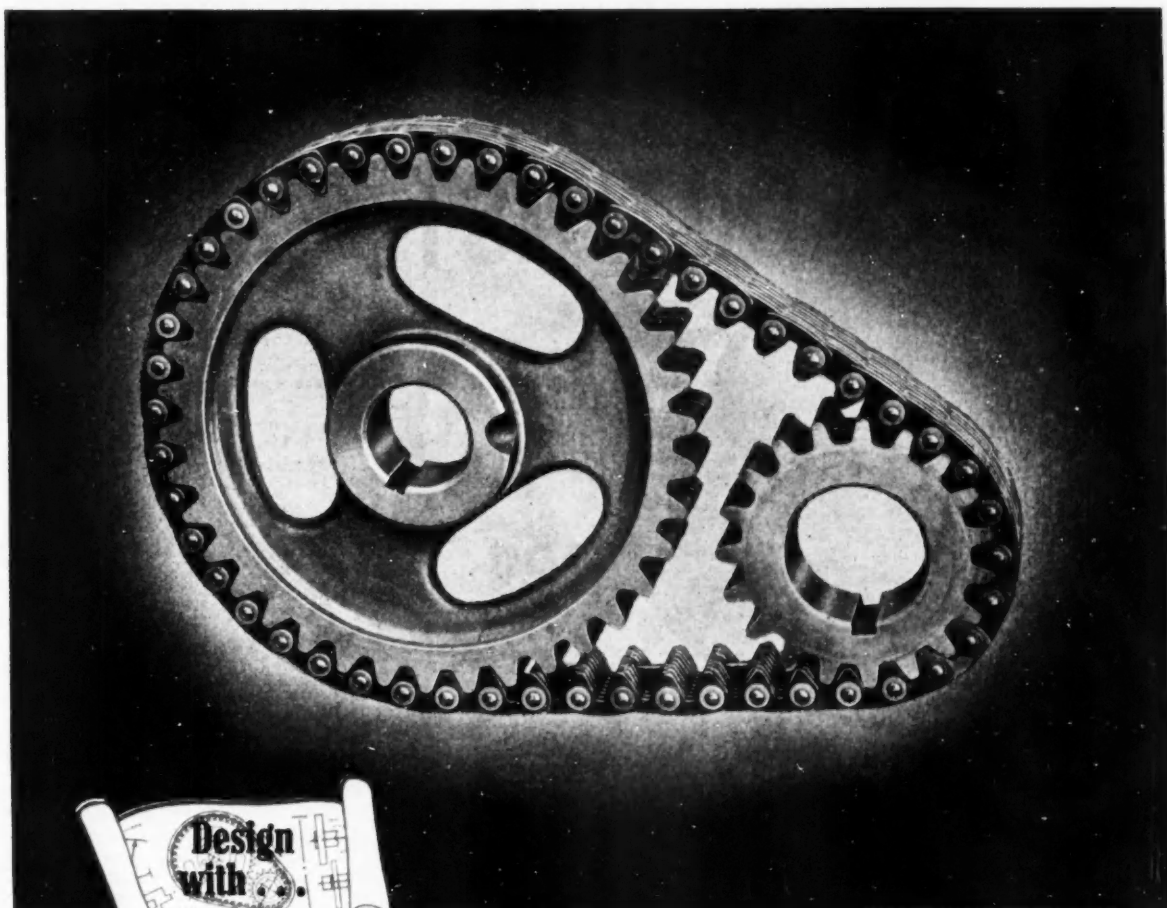
Cabinets of the Chassisluber and Gearluber, as the units are called, each house a motor-operated Lubrigun, and accommodate an original 100-lb refinery drum. An automatic retracting reel and hose assembly is mounted in a separate compartment of the cabinets.

The semi-circular sleeve section of each cabinet is mounted on a vertical telescopic slide. Sleeve with Lubrigun can be lifted to raised position to permit simplified drum changing.

(Turn to page 170, please)

Be sure you get all 3...

✓ Automatic joint snugness ✓ Smoother operation ✓ Longer life



Link-Belt Timing Chain

Segmental Bushings provide

automatic joint snugness



Segmental bushings are made with slight bow.



After initial assembly in chain, bushings are straight.



Bow in bushing acts to keep a snug joint, maintaining chain pitch automatically.

THE secret behind Link-Belt Timing Chain's smoother operation and longer life is the exclusive Segmental Bushing. Note in the sketches above the automatic compensation for wear—provision for complete joint snugness at all times.

Equally important, the facilities of the world's largest chain plant are your assurance of a con-

tinuing supply. Constant research keeps you informed on latest technical advances. Engineering and specification details are in Book 2065.

LINK-BELT

TIMING CHAINS and SPROCKETS

LINK-BELT COMPANY: 220 South Belmont, Indianapolis 6, Ind. Offices in principal cities. 12,741

Why does this IMPACT Socket OUTLAST ordinary ones?



Williams IMPACT "Supersockets"® are made of extra-tough, fully heat-treated alloy steels to withstand pounding and shock long after ordinary types are scrapped. This adds as much as 20% more on-the-job service.

Equally important, the special design and close tolerance machining assures a better fit which extends life of both power driver and drive tang. You get greater efficiency from this equipment.

**WRITE us for Catalog A-100. Ask your
Williams Distributor for a trial demonstration.**



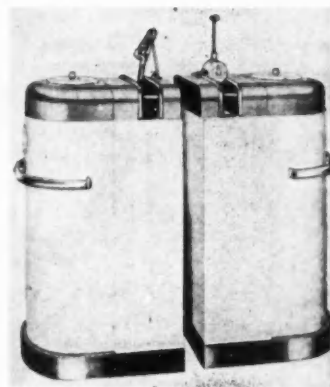
J. H. WILLIAMS & CO. 475 Vulcan St., Buffalo 7, N. Y.
Known for Quality Drop-Forgings and Drop-Forged Tools

New Products

For additional information please use
postage-free reply card on page 65

(Continued from page 168)

Spring latches automatically hold sleeve and Lubrigun while change of drums is accomplished. Hose outlets can be withdrawn from either side of cabinets to full extensible length.



The units can be arranged back-to-back to form a single battery of equipment alongside lift. Installation is accomplished by connecting air supply lines to quick air couplers within cabinets. *Lincoln Engineering Co.*

Circle P-20 on page 65 for more data

Traction Supplement

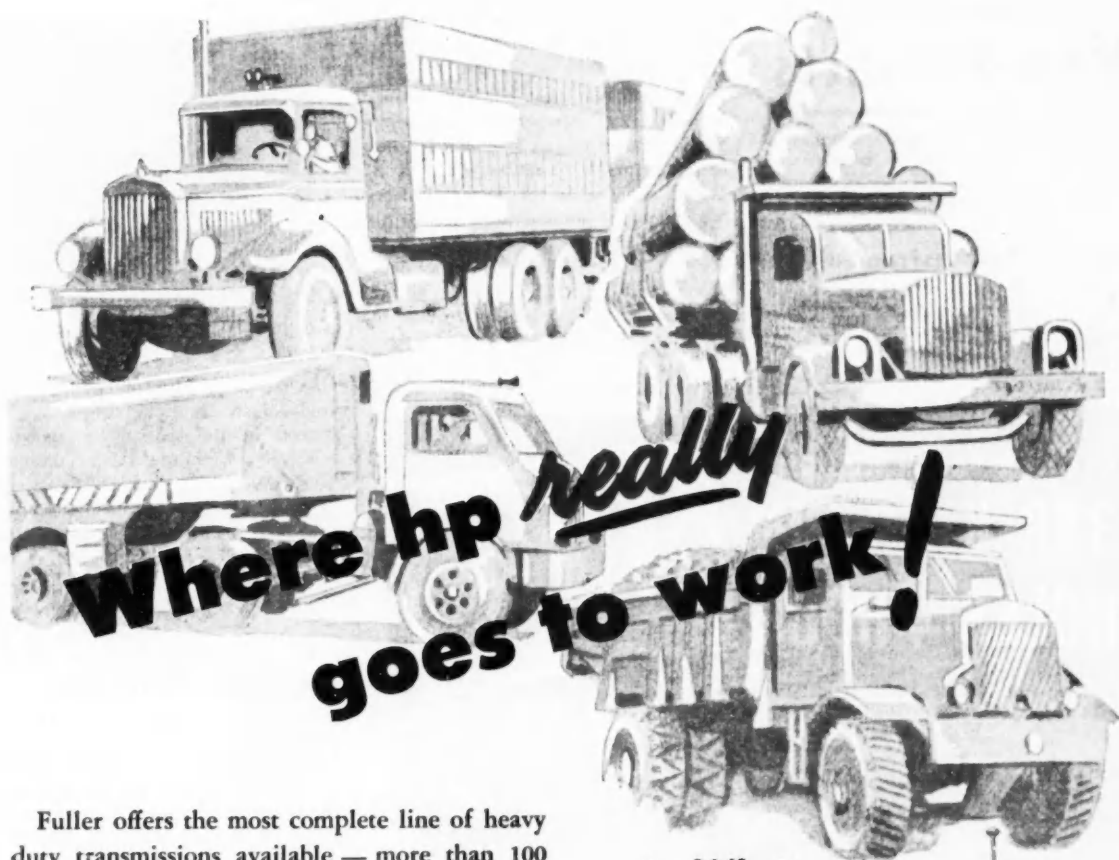
Called E-Z-OUT, a rear wheel traction supplement for driving on ice and snow-packed streets is made of silicates that expand into billions of irregular shaped particles. The light weight of the product is said to cause it to cling to the tire and resist centrifugal force. Excellent frictional qualities are claimed by the manufacturer. *American Bildrok Co.*

Circle P-21 on page 65 for more data

Farm Tractor Tire

Recently marketed is a farm tire for rear wheels of tractors that will reportedly speed up farm work and cut operating costs. Known as the Ground Grip Open Center, it has a double-thick base at the ends of the center bars. *Firestone Tire & Rubber Co.*

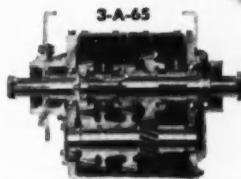
Circle P-22 on page 65 for more data
(Turn to page 172, please)



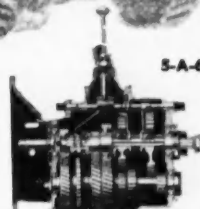
Fuller offers the most complete line of heavy duty transmissions available — more than 100 models—for every heavy duty application using internal combustion engines.

There's a Fuller unit or auxiliary transmission for any application—from two tons to the biggest—to provide exactly the *right gear ratios* for your job—to help your driver keep the engine turning at its most effective speed . . . to assure faster trips—higher average speeds.

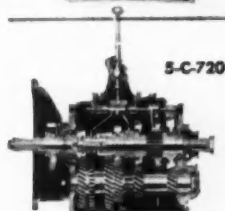
That's why you see the Fuller name plate on the gear boxes of more and more trucks and industrial machines. Demand transmissions from the Fuller line to get maximum performance from your rigs.



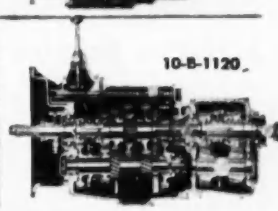
3-A-65



5-A-620



5-C-720



10-B-1120

where horsepower ^{really} goes to work



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

New Products

For additional information please use
postage-free reply card on page 65

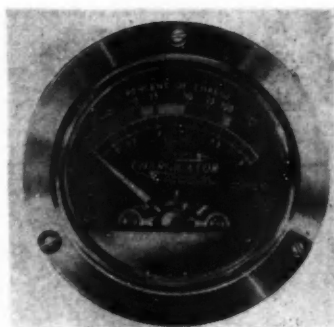
(Continued from page 170)

Battery Test Instrument

Now available is an electrical instrument, known as the Chargerator, that is said to show continuously bat-

tery condition and state of charge—plus the over-all condition of the electrical system.

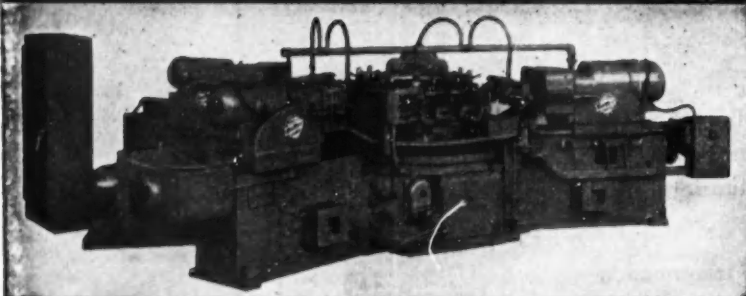
It is claimed that the instrument immediately identifies troublesome battery conditions so they can be corrected before the battery fails. It is said to show when the battery is taking a charge, holding its charge, and how the voltage regulator and generator are working. It also shows condition of the starter and power consumed under load, according to the manufacturer.



A mounting bracket is supplied for under-dash location, or it may be placed in the instrument panel by cutting a hole 2½ in. in diameter. Hook-up is made directly to the battery terminals by connectors supplied. The instrument is available for either six-v or 12-v batteries. *The Hickok Electrical Instrument Co.*

Circle P-23 on page 65 for more data

Drilling and Reaming 388 KING PIN HOLES PER HOUR



Station Type Indexing Machine for
drilling and reaming king pin holes.

On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION INDEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

1. Drill .53/64" dia.—Half way through.
2. Drill .823" dia.—Balance of way through.
3. End Cut Ream .8547/.8550" — Full length of hole.
4. Finish Ream .8635/.8637"—Full length of hole.
5. Load and Unload.

Two RH and two LH pieces are completed at the end of each cycle. Cycling is automatic, and, operator loads and unloads during machine cycle.

4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

Free Data

Will be furnished on request.



Davis & Thompson Company

6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

Hydraulic End-Loader

Currently available is a hydraulic end-loader for all makes of trucks. Known as the LOAD-evator, the unit is available in four models with loading space of 28 by 84 in. to 34 by 90 in. Models are said to be adaptable to all trucks of 1½-ton size and over and have a load capacity of 2000 lb.

Power is supplied direct from the truck engine through a transmission-mounted power take-off. The latter activates a hydraulic hoist which lifts or lowers the end gate as desired. Action is controlled by a single spring-loaded lever for constant, safe operation. Heavy tubular lift arms with built-in overload capacity are reported to be another important safety factor.



In addition to standard models, the units are furnished with a number of special accessories for various industries. (Turn to page 176, please)

How the Fable of "The Birds, The Beasts & The Bat"

has a parallel in Cutting Fluids



... thanks to Aesop for this Fable

The Birds were engaged in a fierce battle with the Beasts. The Bat figured he could pass as either a Bird or a Beast and he wanted to be on the winning side. As the battle see-sawed he flitted back and forth. The Birds finally won but the Bat got back to their side too late and was chased away to a cave, where he has lived ever since, ashamed to come out except at night.

The Parallel...

Like the Bat in the fable, some cutting fluids appear to be both Bird and Beast, but may be neither. If you are going to tap a tough, difficult to machine metal you need a heavy duty cutting oil with high *anti-weld* and good *lubricity* characteristics. On a less exacting light milling job a conventional water-mix fluid with good temperature regulating properties is usually the answer.

The point the fable emphasizes is that a cutting fluid can't be on both sides of the fence. You don't need a different fluid for every job but you need one that's *right* for the job. Stuart products and Stuart experience will give you the best possible results in terms of finish, tool life and production. Ask to have this demonstrated to you by a Stuart Representative.

More Than a "Coolant" is Needed

D. A. Stuart Oil Co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2733 S. Troy St., Chicago 23, Ill.

SEND FOR BOOKLET entitled *More Than a "Coolant" is Needed*

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

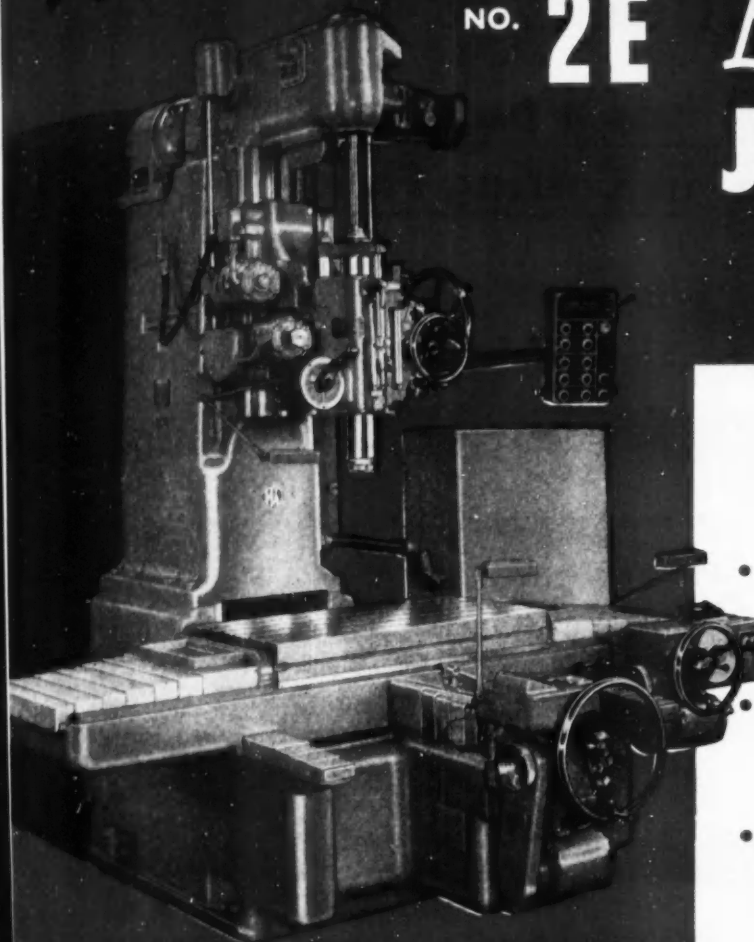
to D. A. Stuart Oil Co., Ltd., 2733 S. Troy St., Chicago 23, Ill.

Your Name

Title

NOW THE NEW PRATT & WHITNEY NO. 2E *Electrolimit* JIG BORER

THE PRACTICAL SIZE FOR
THE AVERAGE TOOL ROOM



There is no better Jig Borer available anywhere at any price than this new Pratt & Whitney Number 2E. As a result of the knowledge gained in producing the 1E and 4E Jig Borers, it incorporates every detail of job-proved advanced design features, metallurgical control, manufacture and inspection that can contribute to fast, accurate performance and convenient operation. This outstanding machine tool brings you the full benefit of Pratt & Whitney's research facilities, modern production equipment, latest craftsmanship and experience from nearly a century of successfully serving industry throughout the world.

Wherever high-precision work must be produced rapidly and dependably, day after day, the Pratt & Whitney 2E Jig Borer is the first choice to meet your needs best.

BRINGING THESE OUTSTANDING ADVANTAGES OF THE PRATT & WHITNEY SERIES "E" ELECTROLIMIT JIG BORERS TO YOUR MANY SMALL AND MEDIUM SIZED, HIGH-PRECISION JOBS

- THE NEW P&W *Electrolimit* MEASURING SYSTEM
This entirely new method of locating the table is extremely fast, accurate and easy to use. Wear is eliminated and the high original precision is retained indefinitely.
- EXCLUSIVE PRECISION PRELOADED BALL ROLL QUILL
The hardened, ground and lapped spindle quill "roll-feeds" in a preloaded ball roll mounting. Accuracy to "tenths" is assured indefinitely without maintenance or adjustment.
- P&W OPEN SIDE CONSTRUCTION
Large, irregular shaped work pieces are handled with a convenience and speed impossible with any other type of jig borer construction.
- AMPLE CAPACITY
Table working surface is 22" x 44", longitudinal travel 36" and transverse travel 22". Table top to spindle end, maximum, is 27"; special columns 6" and 10" higher than standard can also be supplied.

PRATT & WHITNEY End Standard JIG BORERS

Pratt & Whitney will continue to manufacture its famous line of Jig Borers equipped with End Standards, featuring the same high precision quality and performance as the Series 2E, but without the *Electrolimit* Measuring System.

Other PRATT & WHITNEY *Electrolimit* JIG BORERS

NOW IN PRODUCTION:

THE 1E

Compact and versatile with table sizes of 12" x 24" and 12" x 42".

THE 4E

Largest precision jig borer built with 36" x 72" rectangular table or combination rectangular and built-in 48" rotary table.

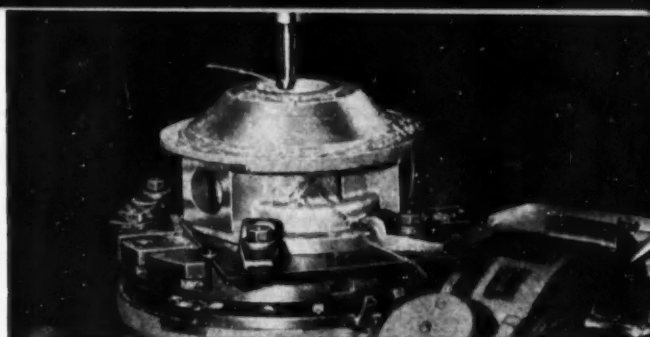
THE 3E

Intermediate capacity with a 28" x 56" table.

AND ON THE WAY:

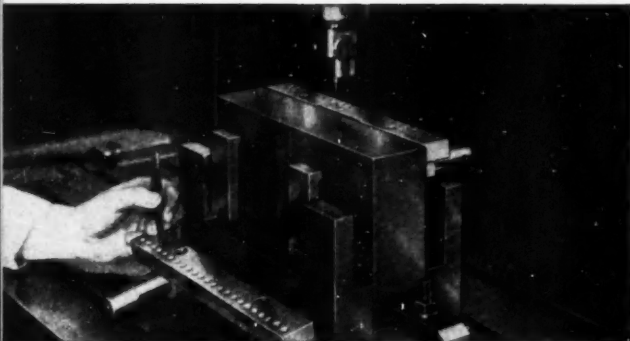


Machining of components for this big die, 48" square, is handled with a P&W 20" Rotary Table on a Pratt & Whitney Jig Borer. A total of 160 holes on the die ring and punch pad are drilled and bored to a tolerance of $\pm .0001$ " making possible a uniform fit in any combination of assembly.



Here a casting is precision machined on a P&W Jig Borer with a P&W Tilting Rotary Table. Using only ordinary hold-down clamps, 13 holes are bored, 2 surfaces faced and 3 more surfaces precision milled in a single setup. No special fixtures are required.

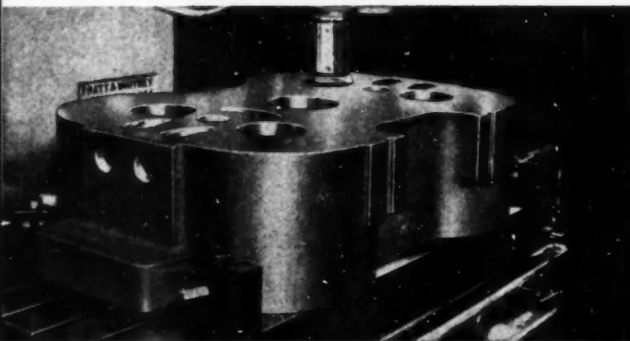
YOU CAN PUT *Performance like this*
TO WORK IN *Your Plant*



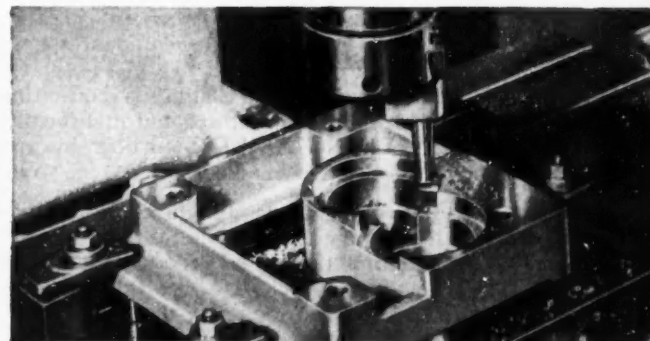
One of these punch and die bars requires 23 holes .1875" in diameter; the other requires 23 holes .3120" in diameter. Using a P&W Jig Borer, they are all single point bored to a tolerance of $+.0000$ ", $-.0002$ "; center distances of .5000", $\pm .0002$ " and a permissible accumulated error of only $\pm .0005$ "



Extreme, dependable accuracy is a "must" in the Aviation Industry. That's why a Pratt & Whitney Jig Borer is used to machine the aluminum alloy aircraft engine part to "tenths" limits. Operations include drilling, boring, facing and precision milling.



Machining this big Meehanite casting for a hydraulic pump, calls for five holes approximately 5" in diameter, precision bored to a tolerance of .0005" for spacing and hole size. A Pratt & Whitney Jig Borer does the job rapidly, dependably, economically.



Shown here is a single point boring operation on one of the four overlapping holes in a machine gear box adapter. The four diameters in each of these two bearing seats are precision bored to a tolerance of .0005" using a Pratt & Whitney Jig Borer.

Write on your
Company letterhead
for Cir. No. 559.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice  *for Accuracy*

BRANCH OFFICES: BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DALLAS (The Brown Co.) • DETROIT • HOUSTON (The Brown Co.)
LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • RICHMOND • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

MACHINE TOOLS • CUTTING TOOLS • GAGES

Engineering Ability



or... how important is a SPRING?

• There's no doubt about it—without springs the mechanical world would be virtually paralyzed. For, like the human heart—in machine after machine, simple or complex, big or little the SPRING is the very source of motivation—the seat of power that propels . . . sustains . . . delays or stores up action.

For instance,—take any product which depends on a spring vital to its mechanism—very frequently a poorly designed spring will cause this product to fail in its performance, *a headache for any manufacturer*, AT THIS POINT—or even in the development stage while your production problem is still “HOT” is the right time to call in Automatic Spring Coiling Co., consulting engineers, trained in production methods and quality control, to bring ENGINEERING ABILITY to bear by providing the correct precision mechanical spring . . . at a minimum cost.

The successful manufacture and productive capacity in large quantities of automobile clocks, as well as, clutch thrust and driven plate springs, all manufactured to close tolerances . . . testifies to the reliable performance of the products of Automatic Spring Coiling Co., in this particular field. Automatic Spring Coiling Co. can supply compression, extension, torsion or double-torsion, helical springs of round or flat wire, flat spiral springs and flat or round wire shapes.

Why not let our experienced Consulting engineers survey your precision mechanical spring requirements without obligation—write today.



AUTOMATIC SPRING COILING CO.
4048 West Thorndale Avenue
CHICAGO 30, ILLINOIS

New Products

For additional information please use postage-free reply card on page 65

(Continued from page 172)

tries. These include side loading ramps, support racks for gas and air cylinder deliveries, racks for double-decking, etc. *The Galion Allsteel Body Co.*

Circle P-24 on page 65 for more data

Combination Washing and Paint-Spray Booth

Now on the market is a combination paint-spray and washing and back-flushing booth.

It is claimed that when the equipment is used for automobile radiators, an operator can do high-pressure external washing, internal flushing, and pressure back-flushing without getting either himself or the near-by area wet.



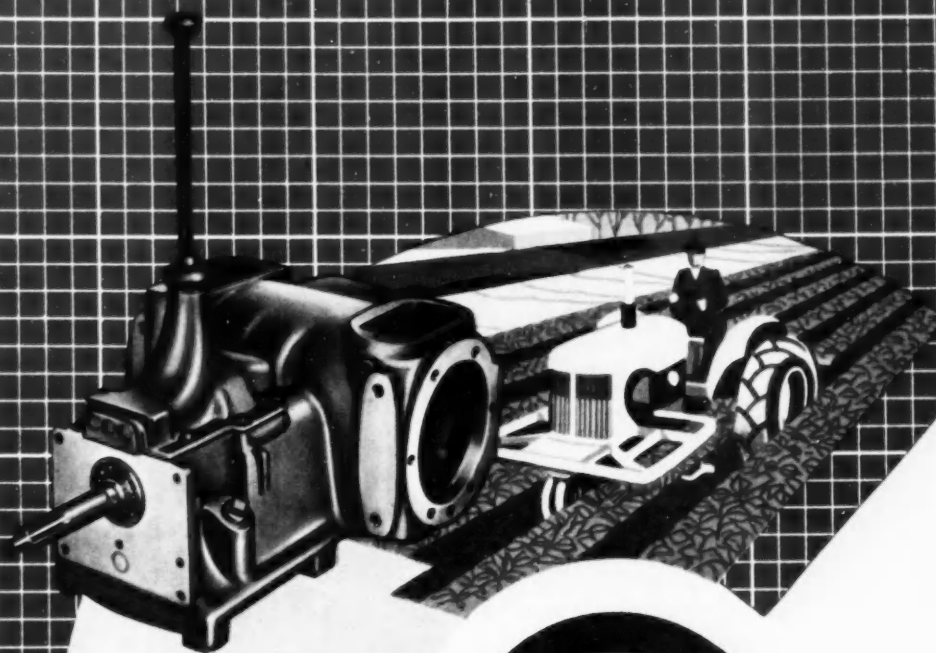
When the unit is used as a paint-spray booth, all fumes and over-spray are said to be efficiently disposed to avoid contamination of the surrounding area. *Inland Manufacturing Co.*

Circle P-25 on page 65 for more data

Upholstery Cleaner

Now on the market is a car upholstery cleaner, called Glamur, which is said to permit quick and easy cleaning. Non-toxic and non-inflammable, the odorless cleaner is brushed on and allowed to dry without rinsing or wiping. *Hosid Products, Inc.*

Circle P-26 on page 65 for more data



CLARK

If your requirements involve the transmission of power in farm tractors, and if you are thinking in terms of performance, dependability and long service, it is more than likely you'll choose Clark Transmissions. They have been favored by automotive manufacturers for more than a quarter century . . . ample evidence, we believe, that "it's good business to do business with CLARK."



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reverse side
more about
products

CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN



Faster...Safer... Easier **THE CLARK WAY**

CLARK ELECTRIC AND GAS POWERED
FORK TRUCKS
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS



INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK, MICHIGAN
Please send me the latest issue of Material Handling News.

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

In all parts of the world, in all sorts of places—at warehouses, in mills and factories, on loading docks and piers—Clark machines are speeding operations, preventing traffic jams, cutting down accidents, multiplying storage-space capacity, and—*making money* for their users. With standard forks or special attachments (quickly interchangeable) they handle just about anything that's movable—boxes, bales, blocks, barrels—speedily, economically. And the precision-engineering of Clark machines keeps them on the job year after year, with minimum maintenance effort and cost.

Find out how you can best utilize this proved and profitable handling method. Special Clark recommendations for your particular operation will cost you nothing, obligate you in no way. Consult the Clark dealer, he is listed under "Trucks—Industrial" in the Yellow Pages of your phone book.

**PRODUCTS OF CLARK—TRANSMISSIONS • FORK TRUCKS & TRACTORS
• POWERED HAND TRUCKS • GEARS & FORGINGS • AXLE
HOUSINGS • ELECTRIC STEEL CASTINGS • AXLES • TRACTOR UNITS**

How To Buy Aluminum Castings

By Floyd A. Lewis
THE ALUMINUM ASSOCIATION

WITH some 2800 foundries throughout the United States casting aluminum, buying aluminum castings might seem like one of the easiest things to do. Actually it is a matter that may involve a number of headaches because many foundries are not properly equipped to produce qual-

ity products. During periods of restricted metal supply, it is particularly important that castings be purchased from foundries that can make the most efficient use of available metal.

A good procedure to follow is outlined in the accompanying "12 Rules for Buying Aluminum Castings." The

12 steps are not always followed in exactly the order listed, and sometimes there is overlapping between two or more steps. But all of these points should be given careful consideration, especially if the castings involve any unusual features.

If the part to be cast is a simple one involving no special requirements or high mechanical strength, the purchase is greatly simplified. Almost any foundry that can produce castings of good appearance may be selected. Any complications in the design or in structural or other requirements, however, must be given careful attention if difficulties are to be avoided. Except for the simplest parts, it is not wise to buy on the basis of bid price alone as any one of a number of possible difficulties may wipe out any apparent saving in purchase price.

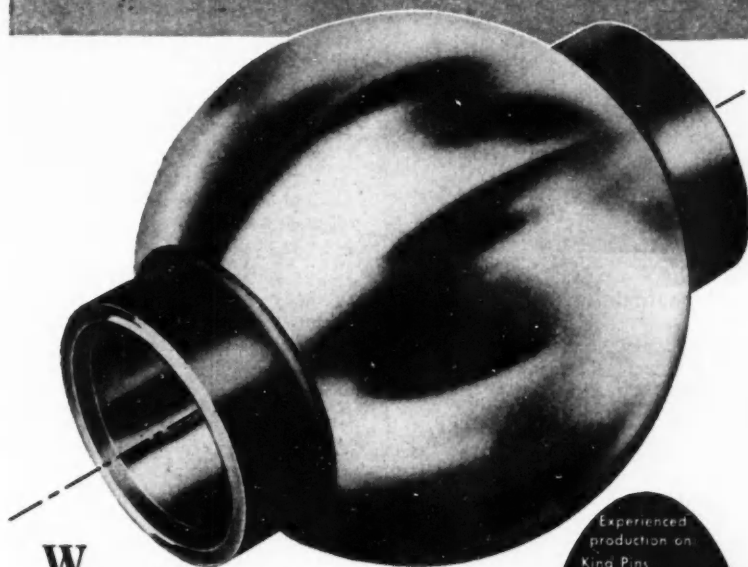
The first thing the purchaser must do is to estimate how many units will be required as this will largely determine the casting process to be used. He must then ascertain the mechanical and physical requirements that the part must meet so that a suitable alloy can be chosen. These steps are closely interrelated because only certain alloys are adaptable to each of the various casting methods.

Other factors that will influence choice of casting process are the size and shape of the part, minimum sectional thickness, dimensional tolerances, surface finish, and relative machining and finishing costs.

Twelve Rules for Buying Aluminum Castings

1. Carefully estimate the number required and the rate of production so that the most economical casting method can be chosen.
2. Determine the mechanical and physical requirements of the part so that the proper alloy can be selected which will also be suited to the casting method.
3. Request bids from several foundries of good reputation that have the experience and facilities to furnish castings of the type desired at the required production rates.
4. Submit detailed drawings and a model or test pattern when available; if a reorder, submit sample casting as previously made.
5. Specify service conditions in detail, especially any points of high

Specialized Production of HARDENED & GROUND PARTS



When you've served the automotive industry for more than 40 years as we have done, you become quite adept at machining difficult pieces like the Beam Ball shown here.

Ball O.D. is ground to $3.375" \pm .001$; Bore, to $1.375" \pm .001$. Circular contour is absolutely concentric with bore centerline. Scientifically controlled heat treating provides exceptional surface hardness and consistent strength throughout. The specified finish is Parker-Lubrizol, as used on many of our products.

This is a sample of the metallurgical engineering, precision grinding and uniform quality that can be readily applied to mass production of your turned, hardened and ground parts. Let us quote on your requirements. Write or wire today.

Henry W. Perry
PRESIDENT

THE BROWN

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C. H. Ehert, 9407 Chardon Rd., Cleveland • N. F. Spring, 4718 Balfour Rd., Detroit • R. C. Sanderson, 8809 N. Clark St., Chicago • Harry J. Windmiller, 1784 Carlton, Fort Worth • John William & Co., 1449 N. Spring St., Los Angeles, Calif. • John B. Hunt, 2611 S.E. Yamhill St., Portland, Ore.

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anything in the hardened and ground line, of any analysis steel, up to 4"

**"washes
cleaner..**

**dries
dryer"**

**" DOES
EXCELLENT
JOB ON
HARD-TO-CLEAN
PARTS "**



noted gear manufacturer reports on

Cincinnati

CLEANING MACHINE

This Cincinnati engineered cleaning system at New Process Gear Corporation processes 20 gears per minute prior to inspection and assembly. Grease, oil and coolant are removed from difficult areas without injuring the easily-damaged parts. Smaller parts are cleaned even faster.

Typical benefits of Cincinnati engineering are illustrated in the heating system of this machine. To obtain maximum efficiency from the gas-fired heaters, combustion products are used in the hot air-blow-off. The heating system itself is equipped with a specially designed, gas-fired, submerged tube designed to utilize maximum heat content of the gas.

If cleaning and finishing are part of your production, a Cincinnati machine can increase efficiency, save time and lower costs. Write for full information.

Catalog available on request.

CINCINNATI CLEANING AND FINISHING MACHINERY CO., INC.
315 HECLA STREET, IRONTON, OHIO



stress, or pressure-tightness, if required. Indicate machining locating points.

6. Ask prospective suppliers if they have control equipment, inspection procedures, and laboratory facilities to assure the attainment of specified physical and mechanical properties consistently.

7. If the casting requires a high-strength alloy, ask prospective suppliers if they have adequate heat-treating equipment with accurate temperature control.

8. If possible, investigate the experience of other customers with prospective suppliers.

9. After a supplier has been tentatively selected, visit him and see for yourself whether he has the sort of plant where you would like your castings to be made.

10. Don't give your order to the lowest bidder unless you are satisfied that he will produce good quality castings at the lowest over-all cost. Sometimes difficulties with machining and finishing and in adjusting rejects will wipe out any apparent savings.

11. After choosing a supplier, provide for the fullest possible consultation and collaboration between your design engineers and his technical personnel.

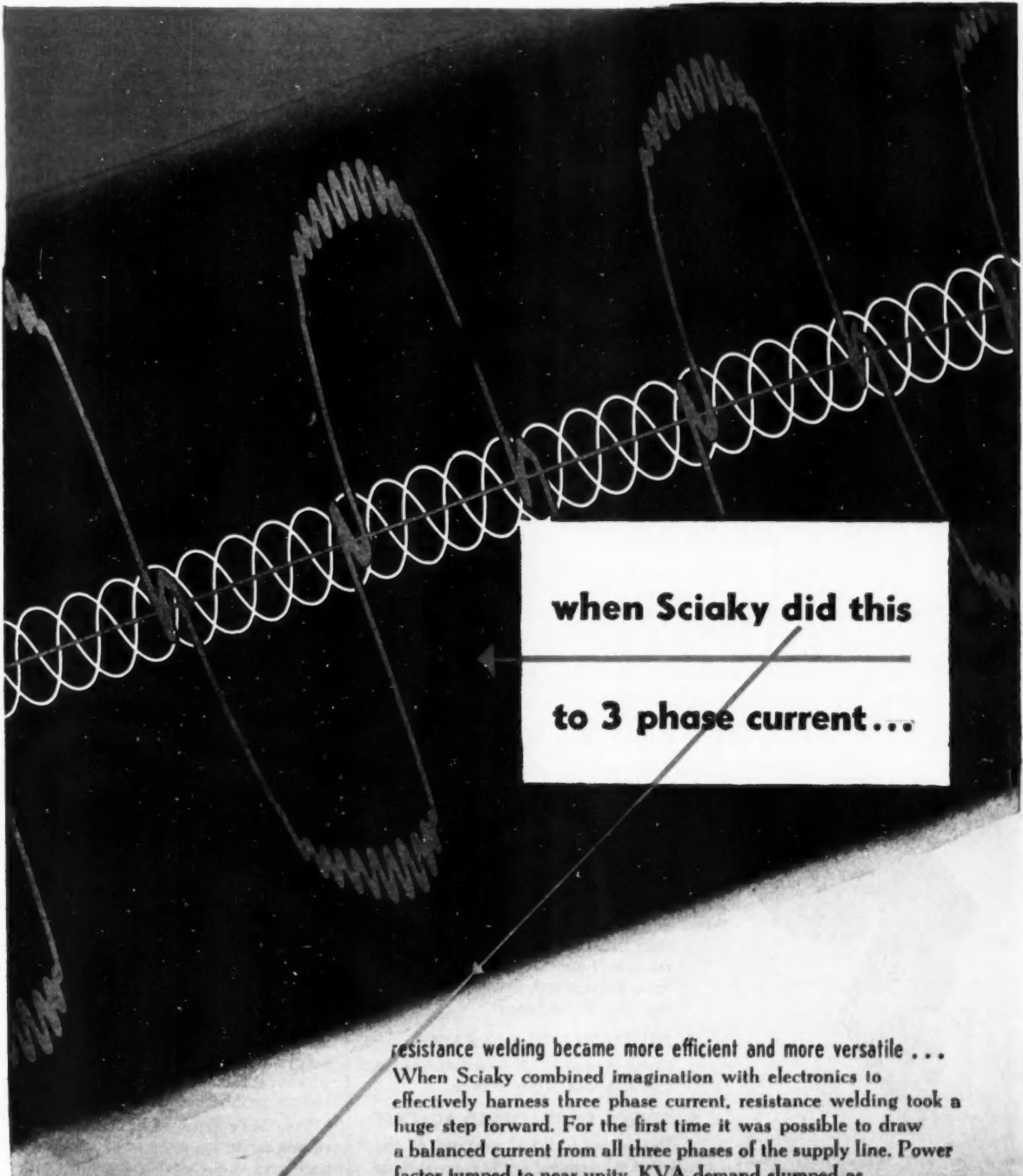
12. Give careful consideration to any changes the foundryman suggests that might simplify production, reduce cost, or result in better castings.

Choosing the Casting Process

About 90 per cent of all aluminum castings now being produced are made by either the sand, permanent mold, or die casting processes.

In sand casting, a pattern of the required shape and size to produce the desired part is molded in sand, the mold being broken to extract the casting and the pattern being remolded for each unit produced. In permanent mold casting, the metal is poured in cast iron or steel molds which are so constructed that the mold may be opened and the casting removed. Any necessary cores are also made of cast iron or steel. Die castings also are produced in metal molds, or dies; but whereas in permanent mold casting the metal flows into the mold cavity by gravity, in die casting it is forced into the cavity under pressure. Both the dies and cores are constructed of heat treated alloy steel.

Sand casting is the most flexible of the three methods and is generally employed for large or intricate castings of all types and sizes where the quantity to be produced will not

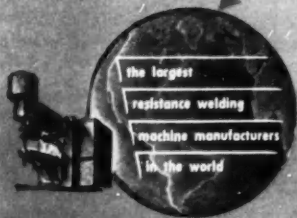


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to 3 phase current...

resistance welding became more efficient and more versatile... When Sciaky combined imagination with electronics to effectively harness three phase current, resistance welding took a huge step forward. For the first time it was possible to draw a balanced current from all three phases of the supply line. Power factor jumped to near unity. KVA demand slumped as much as 50% or more of previous requirements. But most important, resistance welding became more versatile. By simple adjustments one machine could weld many different metals in a wide range of thicknesses.

This is the type of engineering that keeps Sciaky out in front... makes the Sciaky name the symbol of the best in resistance welding.

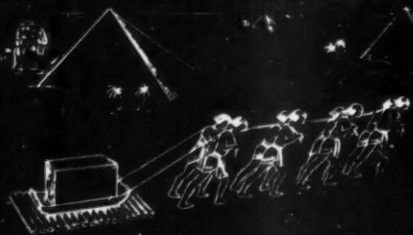


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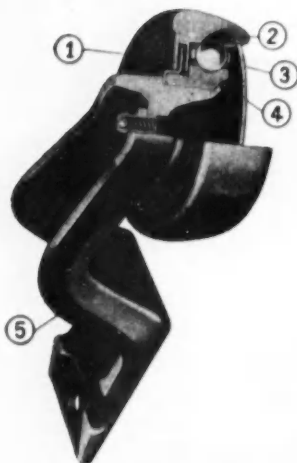
Ancient Egyptian Engineers Developed the FIRST Conveyors

Reputedly, the Pharaohs' great engineers solved their problems for conveying huge stone blocks, used in construction of the Pyramids, by having thousands of slaves "trolley" these tremendous stones from the Nile over tallow-lubricated logs. Nowadays, materials handling is made more efficient, speedy and labor saving because —



JERVIS B. WEBB COMPANY was the FIRST to develop the Triple Labyrinth SEALED TROLLEY the Power behind REGULAR TROLLEY and POWER AND FREE CONVEYORS

The Webb "Red Seal" Trolley has been an outstanding success since its introduction. The fundamental design included flangeless hardened steel wheels, improved tread contour, retainer type ball bearings and hardened and ground races. It showed its superiority in varied services, in hundreds of installations. The present "Red Seal" design offers many improvements (listed here) — placing it far out in front.



1. TRIPLE LABYRINTH SEAL

Three walls of steel to keep the lubricant in and the dirt out.

2. HARDENED STEEL WHEELS

Contoured to fit the flange of the I-beam on which they ride.

3. LARGE ALLOY STEEL BALLS

Eight 15/32". Highest quality alloy steel balls operate in a deep groove retainer type bearing. Due to the lower friction with retainer type bearings, the life is longer.

4. PRECISION GROUND RACES

Large diameter Ground to precision specifications — less friction.

5. STURDY DROP-FORGED BRACKET

The wheel is firmly swaged to the bracket, eliminating loose rivets or bolts, making the wheel and bracket an integral unit.

The 4" No. 3377 Swaged Trolley shown has no bolts, pins or nuts, and like all Webb Trolleys is arranged for pressure gun lubrication.

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justify the construction of a metal mold or die. Sand casting also is used for longer production runs of small and medium-sized parts of a design suitable to modern high-speed molding equipment where costs lower than for other methods can be established.

Both permanent-mold and die-casting processes are inherently mass-production methods. They are, therefore, particularly useful where large numbers of identical castings are to be produced. No specific lower limit can be established at which these processes become economical. Usually several thousand units must be required to make either process feasible, although as few as 500 have been produced economically in special cases.

In general, permanent mold castings have higher mechanical properties, greater uniformity, smoother surfaces, closer dimensional tolerances, and better pressure tightness than sand castings. By taking full advantage of these factors, castings made by this method will usually require less metal for the same design stress than sand castings. The smoother surfaces and closer dimensional tolerances mean lower machining and finishing costs.

Many designs that are too intricate to be produced from a practical standpoint by the full permanent mold process can be successfully cast using iron molds and sand cores. This combination results in what is known as the semipermanent mold method, extending the flexibility of the permanent mold process while retaining many of its advantages.

Ability to cast thin sections, accuracy, uniformity of reproduction, and low unit cost characterize the die casting process. In reproduction of surface detail and surface finish, die casting is superior to any other method. The thinner sections possible with this method permit substantial savings in metal. The dimensional accuracy, smooth surfaces, and ability to cast threads and core holes contribute to minimum finishing cost.

Two basic types of die casting machines are in use—the so-called gooseneck and cold-chamber machines. In the former, air pressures up to about 750 psi are utilized; pressures ranging from about 3000 to more than 20,000 psi, produced hydraulically, are employed in the cold-chamber machine. Because of the superiority of the castings produced at the higher pressures, gooseneck machines are gradually disappearing in favor of the cold-chamber units.

Sand castings weighing from a few ounces up to 1500 lb are commonly produced and castings up to 7000 lb

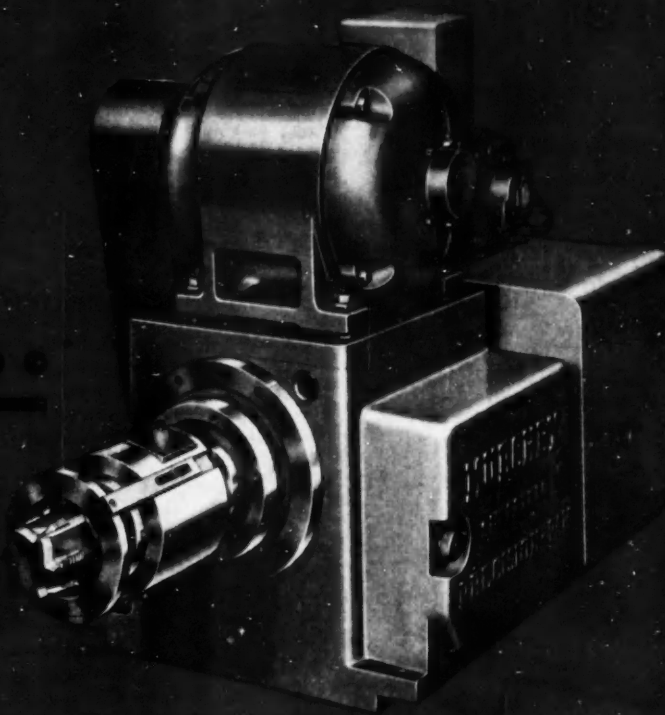
Tap . . .

Thread . . .

Bore . . .

Ream . . .

Automatically



Threading and tapping artillery shells to meet Ordnance specifications or any other high production job can be done AUTOMATICALLY on the new Murchey Precision-Pak—Also boring and reaming when required. Threading is accurately controlled by a precision lead screw, the axis of which coincides with that of the spindle—no intermediate mechanism and consequently no backlash or lost motion—an Exclusive Feature.

The Precision-Pak will fit any transfer machine, or it can be mounted on a truck and moved up

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Length of thread Up to 4"

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have been made by this process. Permanent and semipermanent mold castings from a few ounces to 300 lb in weight are in regular production, but permanent mold castings weighing up to 500 lb have been produced. For die castings the weight range is from a fraction of an ounce up to about 20 lb. Castings having over-all dimensions up to 36 by 12 by nine in. are being produced, but the dimensions in one direction may exceed these, die castings up to 84 in. in length having been produced.

A few parts can best be produced by other methods, such as the plaster mold process, investment or "lost wax" method, and centrifugal casting. Parts requiring smoother surfaces and greater accuracy than can be obtained with any of the three principal processes may be successfully cast in plaster molds. Some of the intricate parts of automatic automotive transmissions which require great accuracy are being successfully produced by this method. The investment process is also capable of great accuracy and is sometimes used for very small complicated parts that can be produced in groups or clusters. Aluminum pipe is successfully cast by the centrifugal method, as well as a number of other parts of special character.

Selecting an Alloy

After the casting method best suited to the design and production requirements has been determined, an alloy suitable for that method which will have the necessary properties may be chosen. Sometimes it is difficult to find an alloy that will have all the desired characteristics. Often the final choice will narrow down to one representing the best compromise between two or more conflicting factors.

The first decision to be made in choosing an alloy is whether one not requiring heat treatment will provide the necessary mechanical and other properties, or whether a heat-treated alloy will be required. Heat treatment increases the strength, but often lowers ductility. Die-casting alloys are not usually given any heat treatment except aging treatments at relatively low temperatures.

Although tensile strength is perhaps the most significant single mechanical characteristic to be considered, an alloy should not be chosen on the basis of that property alone. Yield strength, elongation, hardness, and compressive, shear, and fatigue strengths are other mechanical characteristics that may be significant in any particular application.

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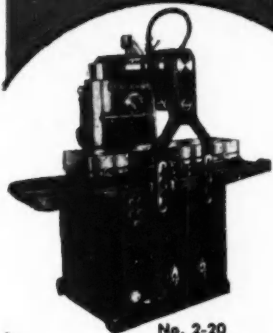
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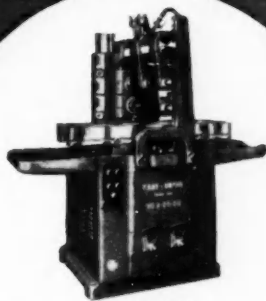


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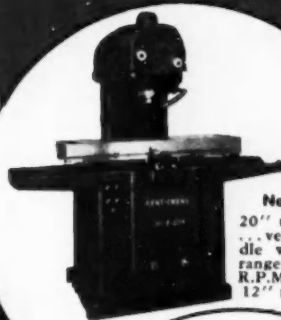
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Los Angeles, New York, Philadelphia,
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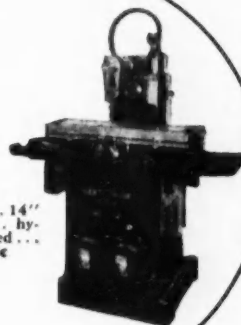
No. 2-20
20" table travel... 42"
x 12" table... full auto-
matic hydraulic table
feed.



No. 2-20DS
Double Spindle for two mill-
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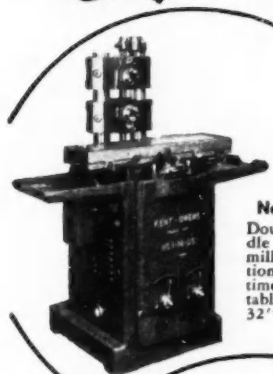


No. 2-20V
20" table travel
... vertical spin-
dle with speed
range 32 to 1284
R.P.M. ... 42" x
12" table.



No. 1-14
32" x 9" table... 14"
table travel... hy-
draulic table feed...
full automatic
cycle.

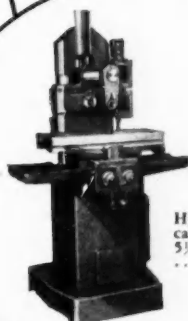
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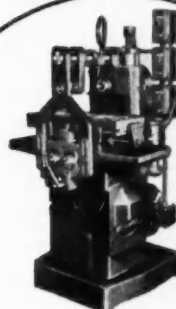
No. 1-14DS
Double Spin-
dle for two
milling opera-
tions at same
time... 14"
table travel...
32" x 9" table.



No. 1-M
Hand feed to table
and head... 25"
x 9" table...
Adjustable head-
counter-balance.



No. 1-V
Hydraulic verti-
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casting qualities. For simple designs where high strength is not a factor, the casting qualities do not require any special consideration; but if the design is complicated or if the castings must be pressure tight, an alloy having good casting qualities should be used.

If the castings will be exposed to corrosive elements such as acids or salt water then one of the alloys having high resistance to corrosion should be used. Machinability is a characteristic that should receive careful consideration for castings requiring considerable machining. While ease of machining and finishing is one of the outstanding characteristics of aluminum castings in general, some alloys machine easier than others.

Where the castings must retain their strength at elevated temperatures, such as those used in internal-combustion engines, one of the alloys possessing this characteristic must be used. Some engine parts require good resistance to wear in addition to high strength at elevated temperatures. Pistons, for example, require this combination of properties plus good casting and machining characteristics.

Alloys containing copper and silicon, either singly or together, or in combination with smaller amounts of other elements, comprise the groups that are most widely used for the great bulk of aluminum casting production. In addition, these alloys cover a wide range of mechanical properties so that they are useful as well for some of the more specialized purposes.

The aluminum-copper-silicon alloys have better casting characteristics than the aluminum-copper alloys, but are not as resistant to corrosion as the aluminum-silicon series. The copper content provides strength and hardness while the silicon content improves the casting qualities and increases the resistance to corrosion. These alloys are particularly well adapted to casting work involving intricate design, having large differences in section thickness, or requiring pressure tightness. Excellent casting characteristics also are found in the aluminum-silicon alloys together with higher resistance to corrosion. For these reasons there is an increasing trend toward the use of aluminum alloys in which silicon is a major alloying element. Although the machining of these alloys is more difficult than that of many other aluminum alloys, the problem is simplified by proper technique, tools, and lubricants.

Pressure tightness, strength, corrosion resistance, and castability in particularly desirable combinations are the outstanding attributes of alumi-



5

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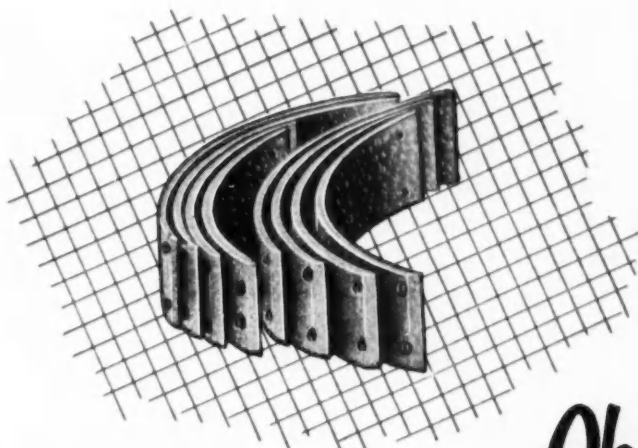
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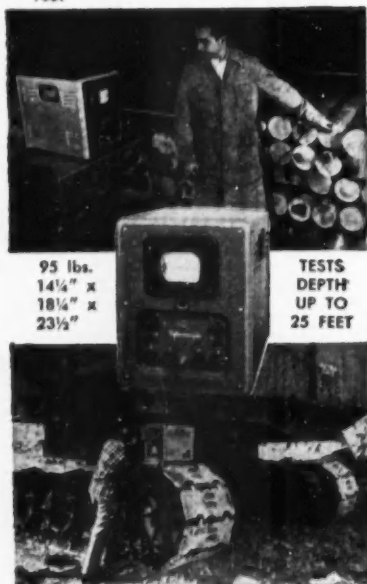
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num-silicon-magnesium alloys. When heat treated they have tensile properties comparable with those of the aluminum-copper alloys. They are outstanding for all types of service requiring high-quality castings, especially those of intricate design.

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Aluminum-silicon alloys are widely used in marine work because of their excellent resistance to salt water and salt-laden atmospheres. Although the aluminum-magnesium series is much more corrosion resistant, these alloys are not used so widely because of their difficult casting characteristics. By adding other elements, such as silicon or zinc, the casting properties are somewhat improved. The aluminum-silicon alloys, however, are superior in mildly acid solutions such as those found in the textile industry.

Many special-purpose alloys have been developed for applications where specific characteristics are desired. Their usefulness, however, usually is limited to the particular applications for which they are designed. Typical of these highly specialized alloys is a binary alloy containing two per cent manganese which has high resistance to slightly acid solutions and has excellent ductility. It has limited use because of its difficult casting characteristics.

Controlled electrical conductivity is required in some electrical equipment. When maximum conductivity is required, controlled compositions of essentially pure aluminum are used. Where the design permits slightly lower conductivity, the addition of 1.5 per cent silicon materially improves the casting qualities. Where low electrical conductivity is necessary, an alloy containing six per cent magnesium, 1.5 per cent manganese, and 1.5 per cent nickel can be used.

These special alloys have their place and should be specified when needed, but only when needed. The buyer will obtain castings of lowest cost by keeping his specifications as simple as possible. In other words, a heat-treated alloy should not be specified if a non-heat-treated one will do. An alloy having difficult casting characteristics should not be selected if one easier for



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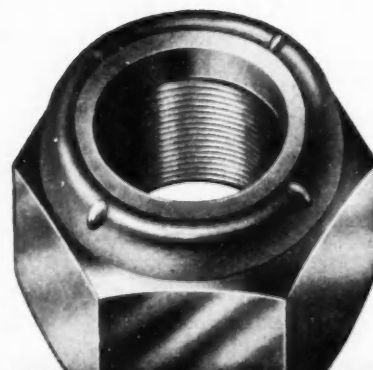


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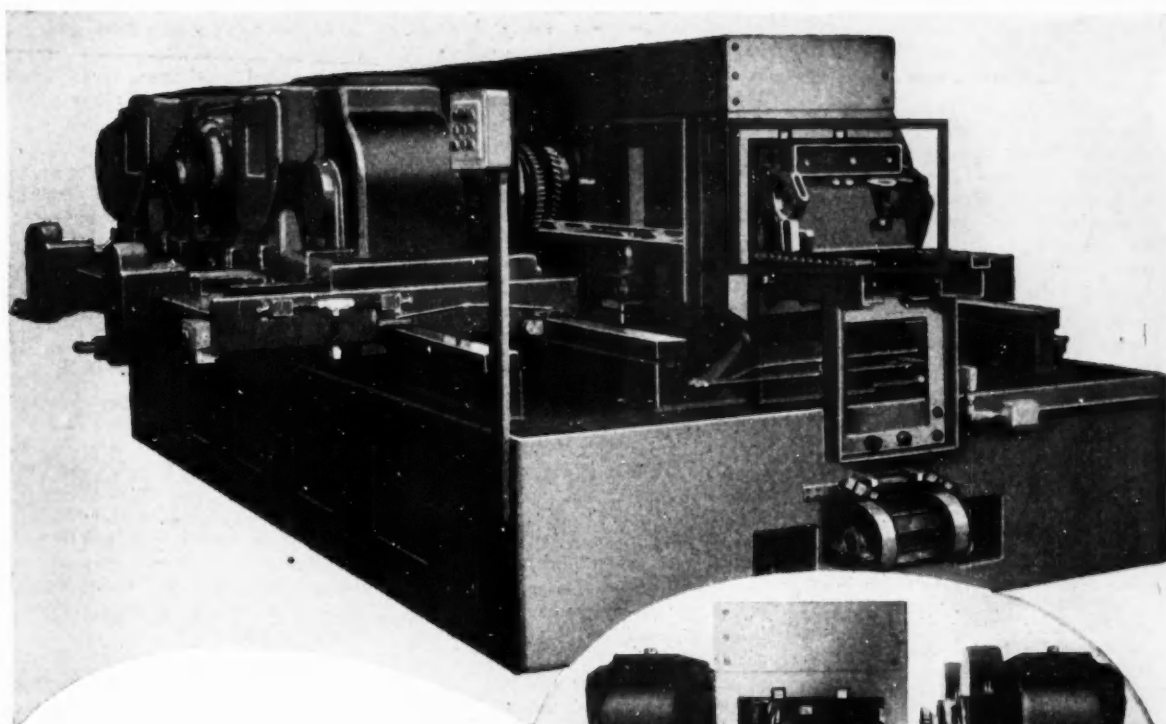
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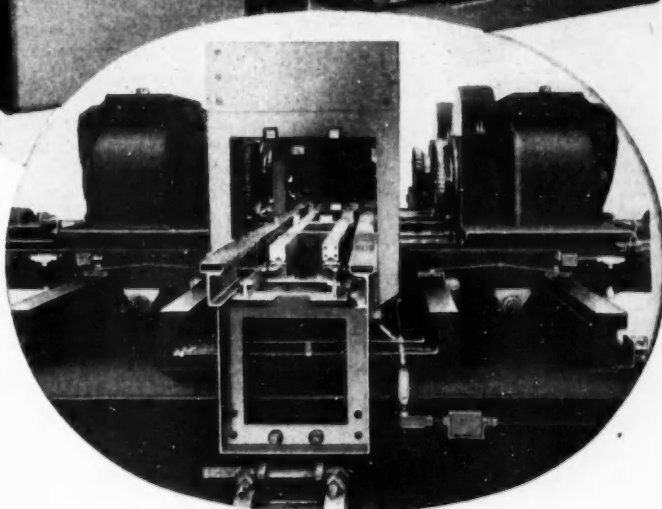
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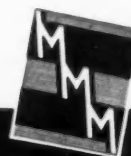
*End view showing transfer mechanism
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Soliciting Bids

After the casting process and alloy have been tentatively chosen, bids should be requested from a number of foundries. At least three should be chosen so that the buyer will have reasonable assurance that the foundry finally selected to do the job will be representative.

The most important consideration in selecting bidders is the foundries' reputations as to consistency of quality and service. Foundries having considerable experience in producing the type of casting under consideration should be chosen. It is equally important to be sure that these foundries have the facilities to produce the castings at the required production rate.

Each bidder should be given a detailed dimensional drawing of the part and full information on service conditions. Both the total quantity and required rate of delivery must be specified for these are important factors in determining costs.

In preparing drawings, all surfaces to be machined should be clearly indicated as well as permissible dimensional tolerances. Close tolerances

should be specified only where necessary. Dimensional tolerances can be held much closer in permanent mold than in sand castings while in die castings still closer tolerances are possible.

If a model or test pattern of the part is available it should be submitted to all bidders. When a reorder is under consideration, a sample casting as previously made should be sent.

Except where a pattern, mold, or die is already available, the buyer should be sure that bidders have adequate facilities for designing and producing such equipment. This is especially important if the part is to be made by either the permanent mold or die casting process. In any event allowances must be made for shrinkage of the metal as it solidifies, for adequate draft so that either the pattern or the casting may easily be removed from the mold (depending upon which process is used), and for finishing where machined surfaces are required. In the interest of accuracy, the main machining locating points should be specified before the pattern, mold, or die design is determined.

Service conditions must be specified in detail in order that the foundryman may bid accurately on the production of castings that will meet those conditions. Any points of high stress

should be specified as well as pressure tightness if that is required. If the castings are to be used where corrosive influences are present, these conditions should be clearly and fully described. If temperatures at which the castings will function differ materially from ordinary room temperature, these must be clearly indicated. Aluminum alloys are stronger at low temperatures than at room temperatures, but they lose some of their strength at elevated temperatures.

Some Questions To Ask

Buyers should ask prospective suppliers a number of significant questions about their facilities. Specifically, they should ask the foundries if they have accurate temperature control equipment for proper handling of the metal. They should also ask if the foundries have inspection procedures and laboratory facilities to assure attainment of specified properties in the finished castings.

If the casting to be produced requires a high-strength alloy, the buyer should also satisfy himself as to the foundries' ability to perform heat treatment. Attainment of maximum strength in heat-treated castings requires that temperatures in the heat-treating furnaces be held within close limits for specified lengths of time. Facilities for rapid quenching also are necessary.

One of the most important matters upon which the buyer should satisfy himself is whether the prospective supplier has a quality control setup adequate to assure the production of good castings meeting the specifications consistently. Consideration of some of the requirements of a good quality-control procedure may help the buyer to determine this point.

An appropriate quality-control program for a given casting will depend partly on the requirements the casting must meet. For example, some highly stressed castings such as those used for vital parts of aircraft must receive 100 per cent X-ray inspection. Castings that are moderately stressed where failure would not involve loss of life or serious interruption of work would not require 100 per cent X-ray inspection but would be produced under X-ray control. The more normal commercial castings which are under low stress and in nonstructural applications, however, require no X-ray control.

In the majority of foundries hot and final visual inspections are made. The castings are examined for the more obvious surface imperfections immediately after removal from the

(Turn to page 193, please)

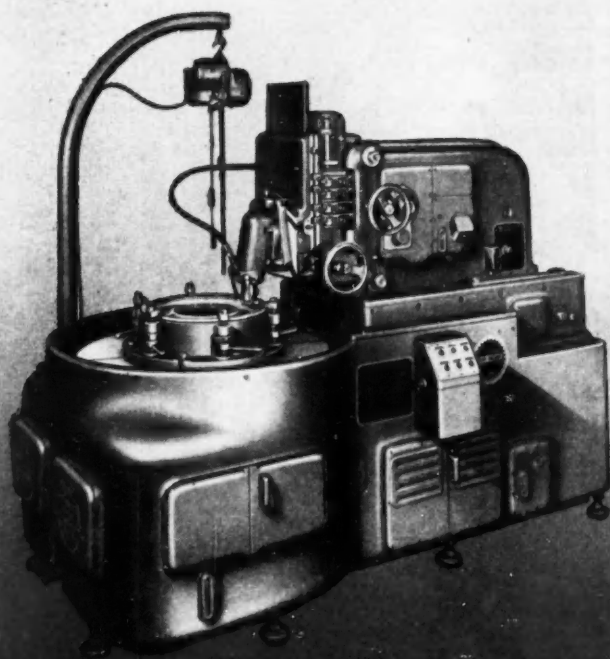


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(Continued from page 190)

molds and therefore while still hot. A thorough visual inspection follows after the trimming and finishing operations, including the required dimensional checks. On large production runs the dimensional inspection often is facilitated by the use of a fixture or jig of the "go-no go" type.

Some foundries are equipped for "chalk" or ultraviolet testing. The castings are first submerged in a bath of penetrant oil. After removal from this bath, the excess oil is cleaned from the surface of the casting. When the casting is thoroughly dry, chalk is dusted over its surface. Any oil remaining in cracks or voids that are open to the surface will darken the chalk in the areas where such imperfections exist.

The ultraviolet method is similar except that the penetrant oil contains a fluorescent dye and the castings after being coated with chalk are examined under ultraviolet radiation. Fluorescence of the oil brought to the surface by the chalk clearly indicates the location and nature of any surface discontinuities. These methods are rarely applied 100 per cent to castings in production. However, they are sometimes valuable in the development of proper foundry procedures for the production of certain types of castings.

Foundries with good quality control setups will usually be equipped to perform all of these checks or at least will have facilities at their command for performing them when necessary. A well equipped foundry with adequate quality control also will have laboratory facilities for making both chemical and mechanical tests. Finally, a good quality-control program will be set up so that any production defects that crop up will be quickly remedied.

Where possible the buyer should investigate the experience of other customers with prospective suppliers. As in practically all other businesses, satisfied customers are a supplier's best recommendation. This is particularly true in the aluminum casting field where the difference between a satisfactory product and an unsatisfactory one depends so largely on experience and on good production equipment.

After a foundry has been tentatively selected, the buyer should ask to inspect the plant so that he can see for himself the equipment that would produce his castings and the conditions under which they would be made. Few reputable foundrymen will deny a prospective purchaser this privilege, and where it is denied the buyer should be especially cautious.

Collaboration Valuable

Buying aluminum castings thus involves more than just getting several bids and ordering from the lowest bidder. Over-all cost should be the criterion and any indications of possible difficulties, such as in machining and finishing or in adjusting rejects, should be evaluated in determining actual cost of finished castings.

Finally, after a foundry has been selected, the buyer should provide for the fullest possible consultation and collaboration between his designers

and foundry technical personnel.

Experienced foundrymen often can suggest changes that do not in any way impair the efficacy of the design or interfere with its proper functioning—yet will greatly simplify production, reduce manufacturing cost, or result in better castings. Reputable foundrymen will offer such suggestions purely in the interest of producing castings that will most economically meet the buyer's needs, and therefore, the buyer should give such suggestions full consideration in preparing his final design.

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Modern statistical quality control procedures
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of Tung-Sol Lamps at the highest levels.



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This chain-driven French cab *electrique* offered the driver a clear view of the road and a cold ride.

This is one of a series of old automobile prints that will appear in future Morse advertisements. Write for your free, enlarged copy, suitable for framing for your collection.



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Over 58,000,000 precision-built Morse Timing Chains have given dependable performance in some 116 different makes of cars and trucks.

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Better timing chains can be yours. A phone call or note will bring a Morse engineer with his wealth of experience and technical advice. Check into Morse Timing Chains now.

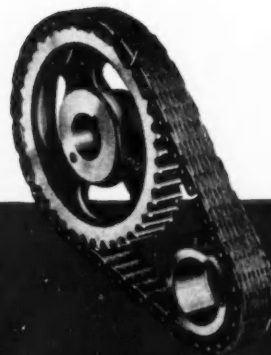
MORSE

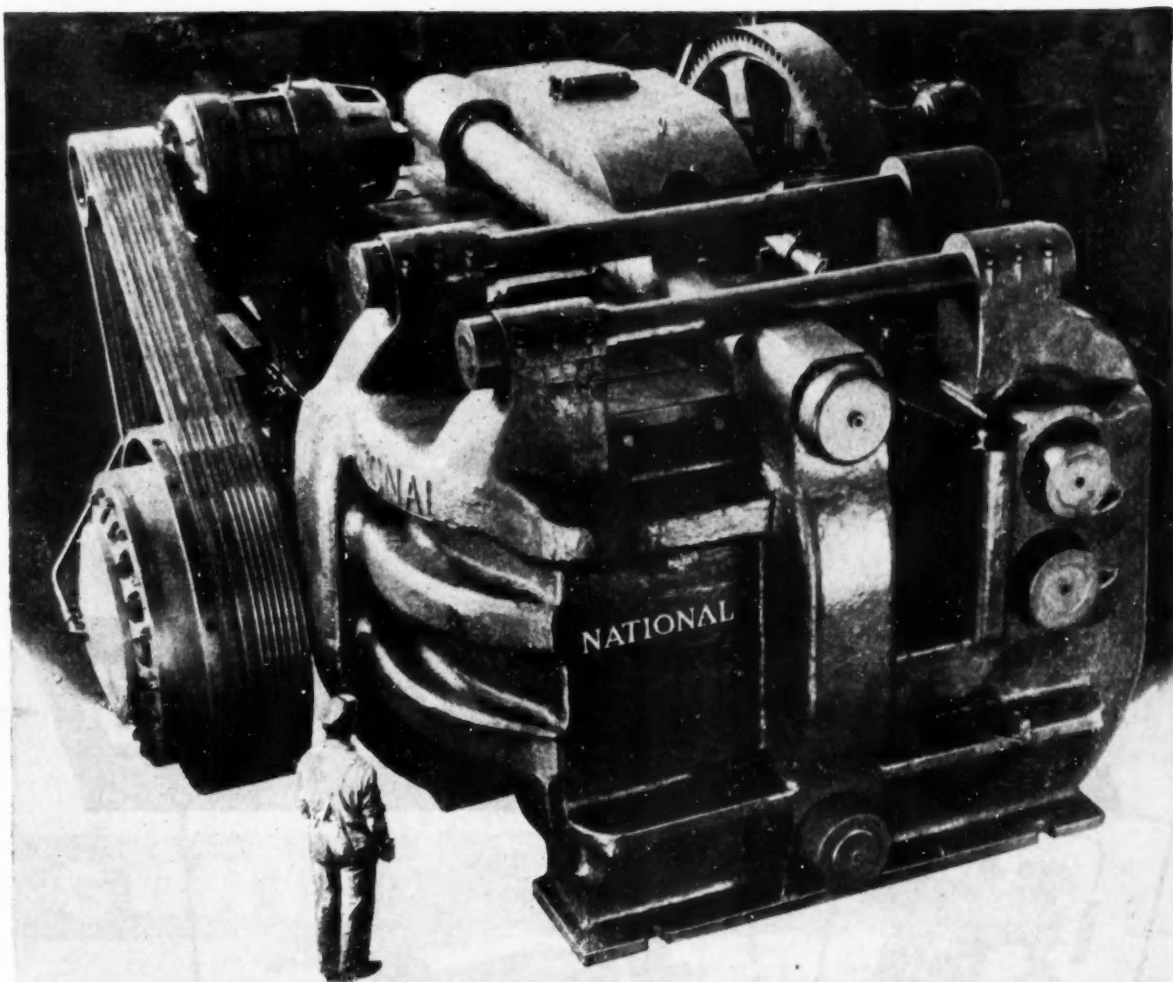
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Built into National Forging Machines is the ability to take in stride difficult deep-pierce and upset-forging jobs.

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THIS DOOR IS ALWAYS OPEN

Forgemen *still* choose National Forging Machines for their difficult work, and *still* come through our Open Door for assistance with their forging problems.

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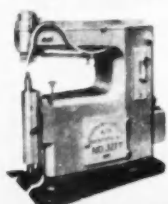
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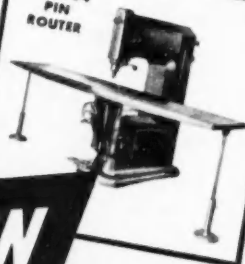
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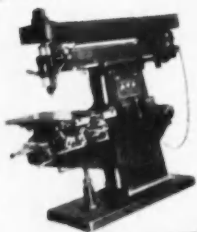


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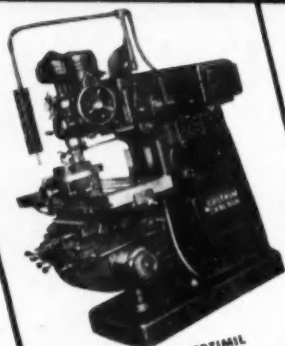
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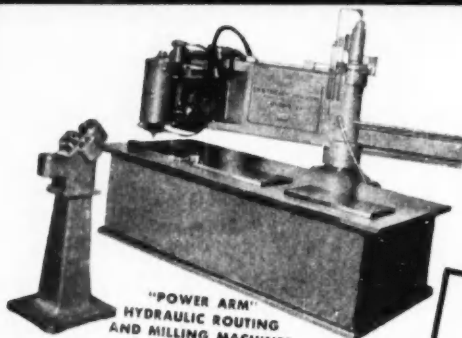
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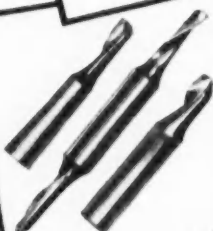
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HYDRAULIC ROUTING
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DRILLS
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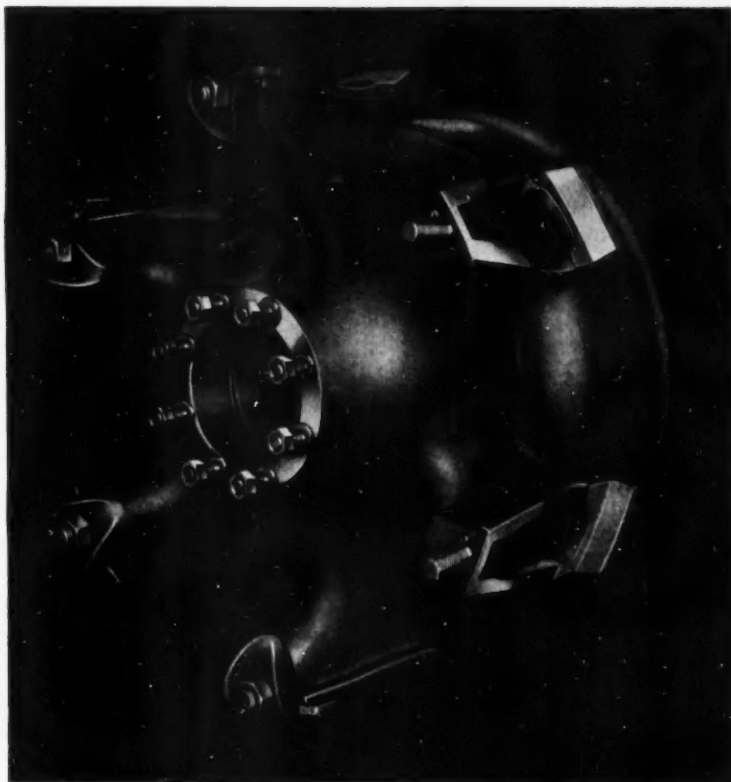
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Rockford, Illinois



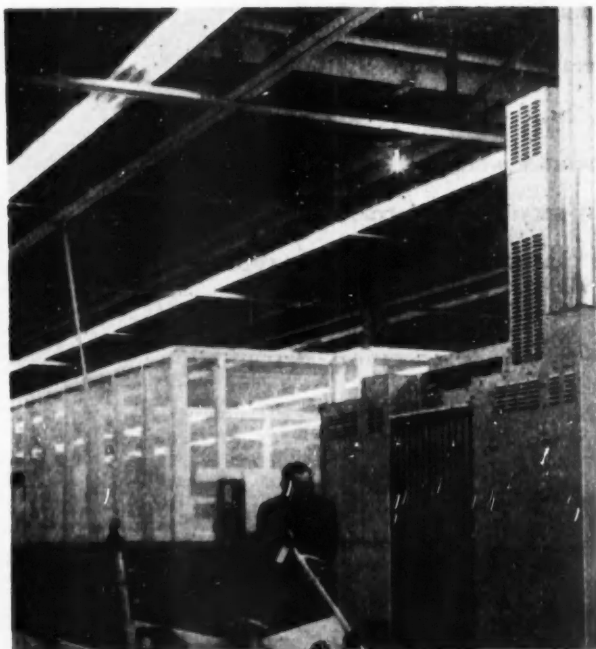
ENGINEERING REPORTS:



TRANSFORMERS FOR POWER TO MANUFACTURE JETS. While power house is built, locations are marked for the two 750-kva transformers shown in background. The double-ended load center,

ready for installation here, will serve auxiliary loads for Packard's new jet engine plant in Utica, Mich. Plant also contains six G-E load-center unit substations installed in three groups.

Load-center units speed building



G-E HIGH-VOLTAGE LIGHTING gives Packard adequate lighting with maximum flexibility and savings in copper and equipment costs.



READY FOR JETS. When completed, Packard test cell will look like this—test J-47 jet engines built for U.S. Air Force.



LAYOUT FOR SECONDARY SELECTIVE SYSTEM. A 1500-kva double-ended load center, being installed, is typical arrangement for secondary selective distribution at Packard. Each transformer is

750 kva. High voltage is 4800 volts. Load center functions like two substations built into one, with tie circuit breaker between the two buses. Low voltage is 480Y neutral grounded.

of Packard's new jet engine plant

Secondary selective system with 480Y-v grounded neutral assures low-cost power continuity

By using pre-assembled G-E load-center unit substations, Packard Motor Company was able to get a fast, inexpensive installation job on the power distribution system at its new jet engine plant in Utica, Mich.

Location of six load-center substations, arranged in pairs of three 1500-kva double-ended load centers, kept pace with construction of the plant bays themselves. A double-ended load center for auxiliary loads went into the power house even before it was completed.

The secondary selective distribution system chosen by Packard assures extreme reliability through its low-cost emergency tie, providing an alternate power source for the load area should either transformer go out. This system also saves cable, reduces operating hazards through low-voltage transfer switching, and permits removal of feeder, transformer, or main secondary breaker for maintenance without dropping service on either low-voltage bus.

For further information on G-E engineered load-center unit substations, contact your local General Electric apparatus sales representative or write for GEA-3592, General Electric Co., Schenectady 5, N. Y.

651-1



SIMPLE INSPECTION. G-E Type AK-1 breaker for low-voltage side pulls out easily for inspection. Big AL-2 breaker is to right center of others.

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UNITED STATES STEEL

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Versatile standard-design National Oil Seals save time and avoid production "log-jams"

You save engineering time, get faster delivery and minimize tooling costs when you utilize standard-design National Oil Seals. National offers over 1,000 such seals, including virtually all commonly used types in standard shaft and bore sizes.

One of the most widely used standard-design seals is the time-tested Na-



Fig. 1. National 50,000 Leather Seal.

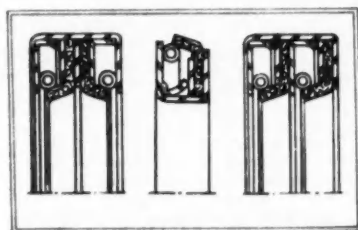


Fig. 2. L. to r., National 70,000, 80,000 and 90,000 Leather Seals.

tional 50,000 series seal (Fig. 1). This design has a precision-made steel outer case and an accurately spring-tensioned sealing member of leather treated by an exclusive National process. It is particularly suited to heavy duty applications where dust and dirt conditions are severe. These seals retain lubricant in their sealing member and can thus run

"dry" for some time without damage. This same type of sealing member is available as a dual tandem, dual opposed or external seal (Fig. 2), or in combination with felt or springless leather auxiliary members.

The basic National 50,000 design is also offered as the National 50,000-S Syntech* seal (Fig. 3). This design has a spring-tensioned sealing member of National Syntech (synthetic rubber). This seal is in wide use throughout industry on automobiles, trucks and buses; electric motors, generators,

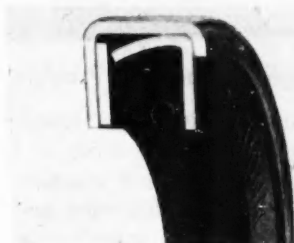


Fig. 3. National 50,000 S Syntech Seal.

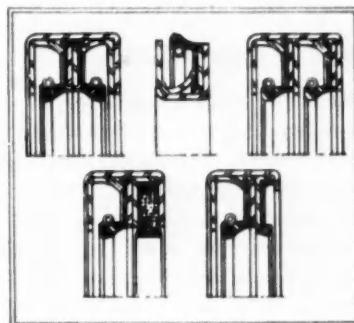


Fig. 4. Top, l. to r., National 70,000-S, 80,000-S, 90,000-S Syntech Seals. Bottom, l. to r., National 10,000-S Syntech-felt and National 20,000-S Syntech Seal.

pumps and other machinery. National Syntech is unaffected by most industrial fluids and is designed to operate over a wide range of temperatures and at shaft speeds up to 3,500 fpm. This design is available as a dual opposed, tandem or external seal, or in combination with felt or springless Syntech auxiliary members (Fig. 4).

Standard National designs also include many Syntech rubber-covered seals. Typical examples are shown in Fig. 5.

National Oil Seals shown here are suited to many different applications, from compact chain saws to giant earth-moving equipment. Next time you

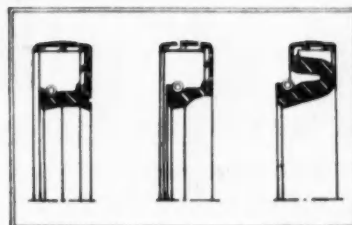


Fig. 5. L. to r., National 320,000, 350,000 and 370,000 Syntech Seals.

specify seals, why not talk to the National Oil Seal Engineer in your area? Chances are he can show you how a standard-design National seal can solve your problem.

"Let Your Decision be Based on Precision"



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HOW HOLLOW BOOMS ARE COLD-FORMED IN ONE OPERATION



on a **PINES** *Automatic* **BENDER**



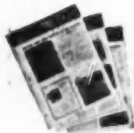
Pines Size 4 Automatic Bender forming loader booms in tractor plant. Tools are shown open after the 41° bend is completed. Production capacity is 50 booms per hour, one operator.

41° Edge Bend in Heavy 12-Gauge Stock Simplifies Production Problem

Here's another example of how cold-forming the "Pines-Way" speed, production and lowers costs. The setup illustrated shows tooling on a Size 4 Bender used for edge bending a heavy 12-gauge (.112") hollow tractor loader boom. The pieces are fabricated with a gradual taper, and two straight U-shaped strips are arc-welded together. By adopting the Pines bending method, instead of making curved pieces on a press, a substantial reduction in die cost and scrap losses are affected.

Smooth, Accurate Bends Produced in Tapered Section

The Bender and special tooling, engineered by Pines, produces a smooth 41° edge bend to a 34" radius. The draw bending principle employed permits holding close tolerances for easy assembly. By using a flexible floating-type mandrel, tapered to fit the inside of the workpiece, and a separate hydraulically-operated hold-down shoe that works in sequence with the clamping die, wrinkles and buckles are eliminated. One man handles the entire bending operation. The hydraulic bending and return cycle is automatic, push-button controlled.



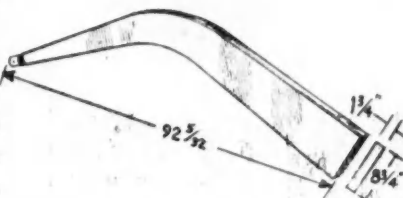
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To get a better idea of the cost-cutting advantages and unusual versatility of Pines Benders, write today for free copies of "Pines News" illustrating and describing actual bending and tooling techniques on a wide range of jobs.

PINES ENGINEERING CO., INC.

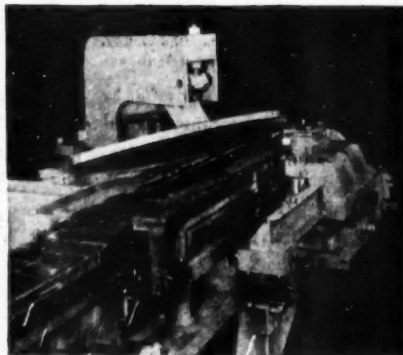
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BENDING • DEBURRING • CHAMFERING • THREADING • CUT-OFF MACHINERY



LOADER BOOM FOR FARM TRACTOR

Workpiece is fabricated from two tapered U-shaped pieces, arc-welded together. Both right-hand and left-hand booms are formed on same machine.



View of floating-type flexible mandrel and tapered sliding pressure die. Automatic air-operated support holds mandrel in proper alignment on forward stroke, retracts for clamping. Same machine with different tooling also cold bends 3" heavy wall pipe for undercarriage loader supports.

653 WALNUT • AURORA, ILLINOIS

You Can Extend Life of ENGINES, TRANSMISSIONS and DIFFERENTIALS



With Allison Torqmatic Drives

BASED on user records, heavy-duty trucks equipped with Allison TORQMATIC CONVERTERS and TRANSMISSIONS last longer and cost less to operate than trucks with mechanical drives.








Records show that Allison TORQMATIC DRIVES boost truck availability, enabling operators to improve their schedules and, thus, they can do more business.

Trucks — and other heavy equipment — with Allison TORQMATIC DRIVES use the flexibility of the converter to start heavy loads and make shock-free gearshifts at full power. The Allison TORQMATIC DRIVES automatically balance engine power with the load requirement. This automatic operation makes the driver's job easier and reduces wear on the whole unit—thus cutting maintenance cost.

You are interested! Attach this advertisement to your letterhead and send it to Allison. You will receive detailed evidence on what these Allison TORQMATIC DRIVES will do for you.

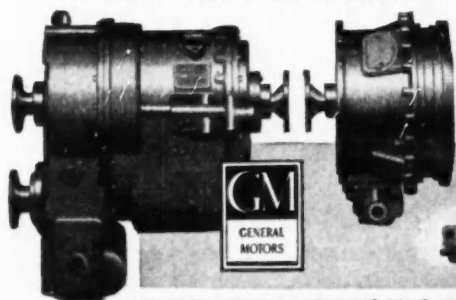
And the next time you're ordering heavy-duty equipment, you'll ask your dealer or manufacturer for units with Allison TORQMATIC DRIVES.

ALLISON Division of GENERAL MOTORS
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RATE OF COMPONENT OVERHAULS			
MECHANICAL POWER TRAIN			
ENGINE	CLUTCH	TRANSMISSION	DIFFERENTIAL
			
	3.4	2.18	76
CONVERTER POWER TRAIN			
			
46		46	39

Rate of clutch, transmission and differential overhauls per engine overhaul for trucks equipped with mechanical drive and Allison TORQMATIC DRIVES. It shows that trucks with Allison TORQMATIC DRIVES have longer engine life, longer transmission life, and longer differential life.

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For locknuts and lockwashers, the *quality* name is Standard.

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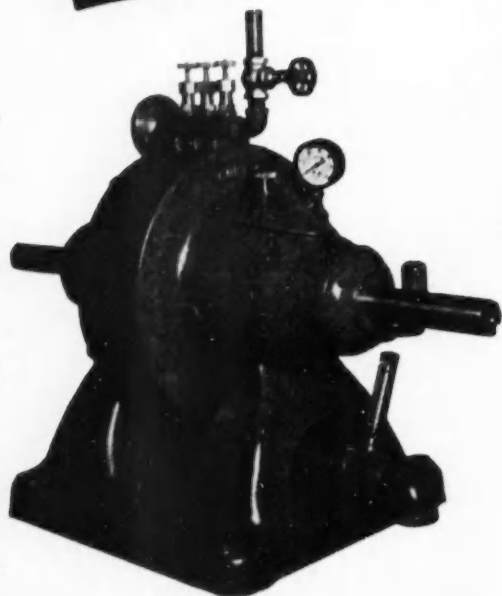
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All frictional and torque losses, except of cradle bearings, are measured. Consequently a high degree of accuracy (approx. 99.7%) is maintained. Compared on a H.P. and R.P.M. capacity basis, and considering the low initial cost, minimum maintenance expense and small floor space required, you can have HI-EFF accuracy at cost savings that will surprise you. HI-EFF offers the most economical maintenance and investment cost per hour.

Taylor HI-EFF Hydraulic Dynamometers are available in 72 different capacity models — Capacities range from fractional to 10,000 H.P. Speeds from 0 to 25,000 R.P.M. Reversible if desired.

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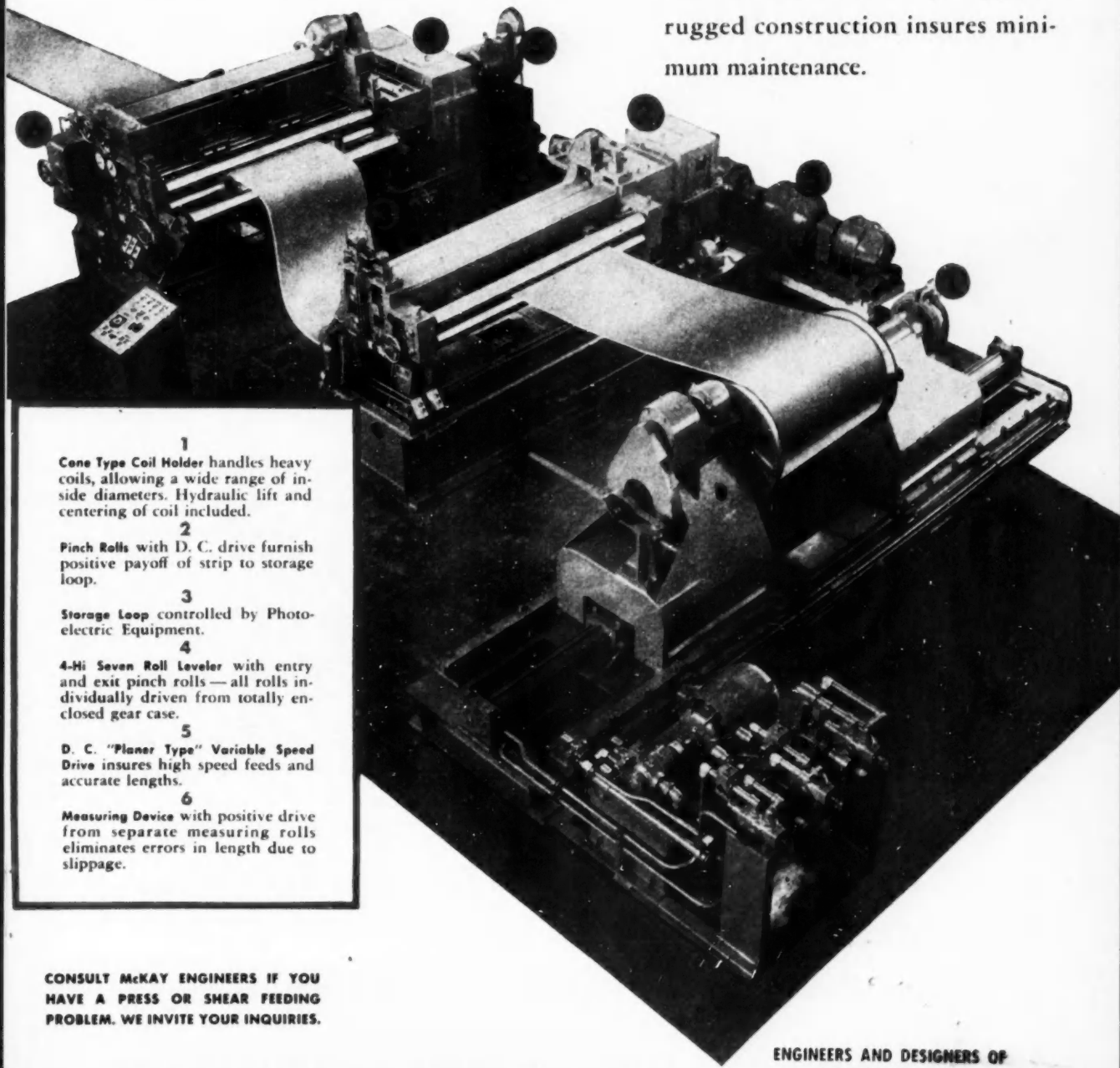
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Cone Type Coil Holder handles heavy coils, allowing a wide range of inside diameters. Hydraulic lift and centering of coil included.

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Pinch Rolls with D. C. drive furnish positive payoff of strip to storage loop.

3
Storage Loop controlled by Photoelectric Equipment.

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5
D. C. "Planer Type" Variable Speed Drive insures high speed feeds and accurate lengths.

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Measuring Device with positive drive from separate measuring rolls eliminates errors in length due to slippage.

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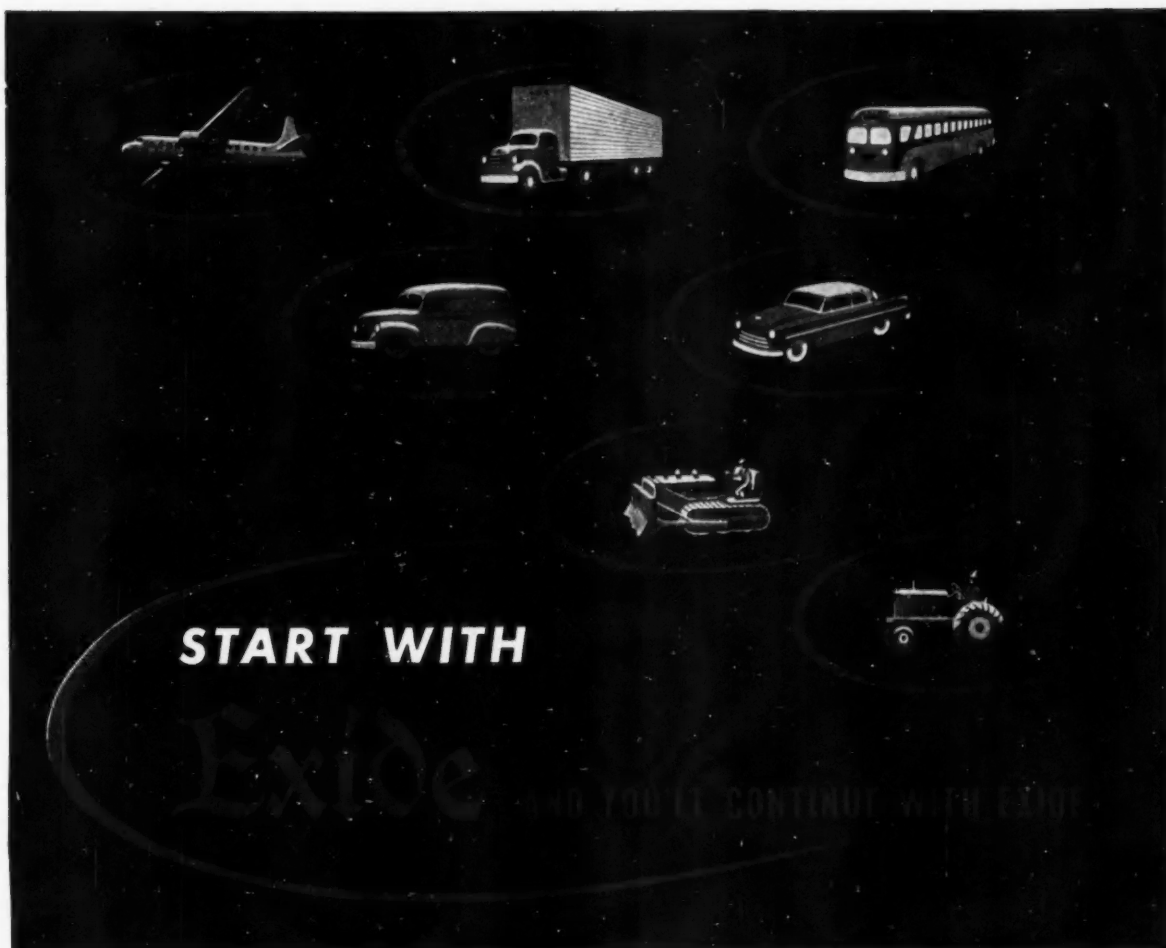


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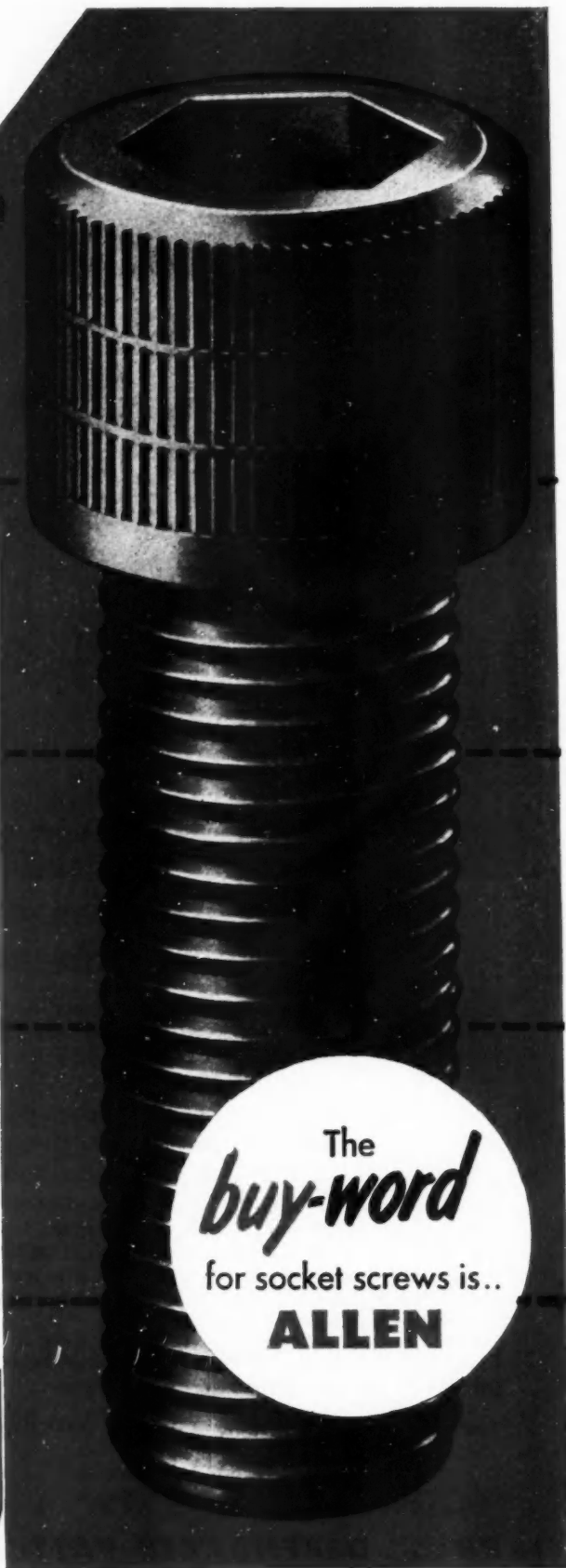
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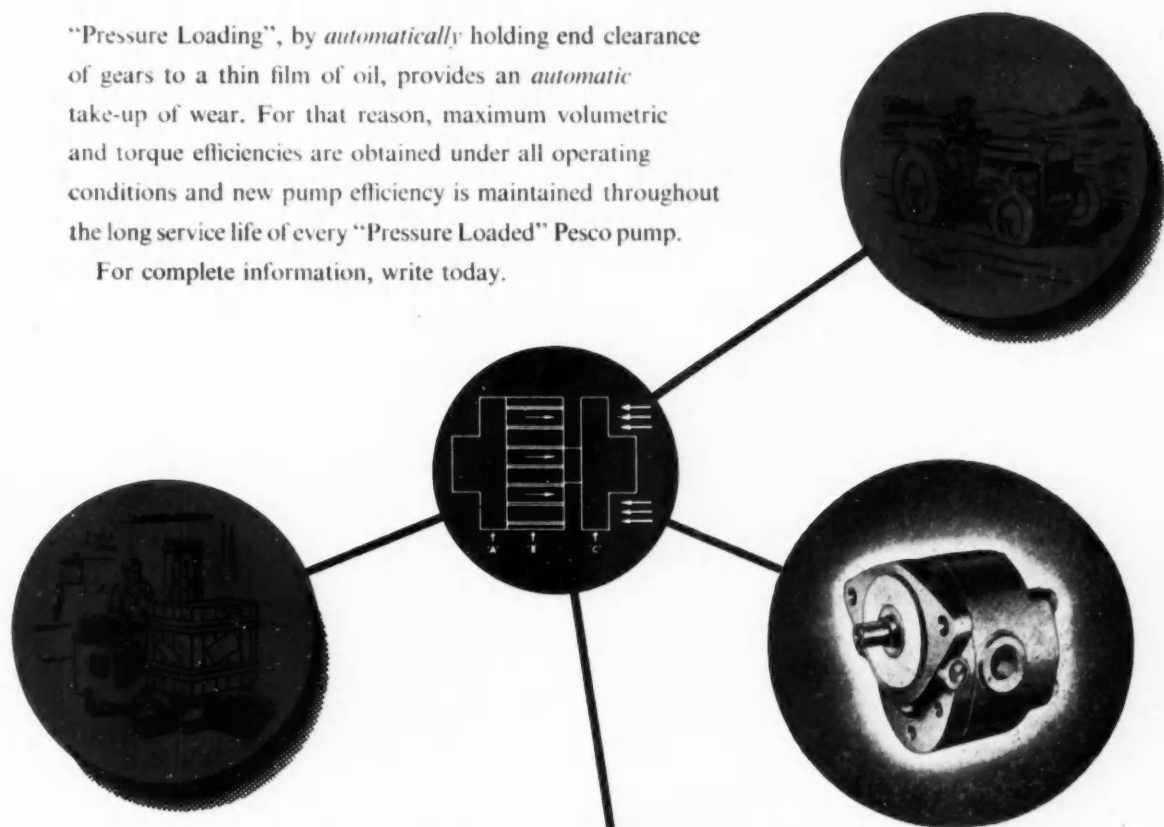


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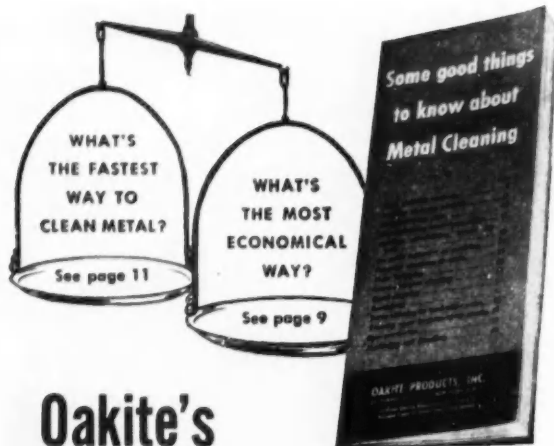
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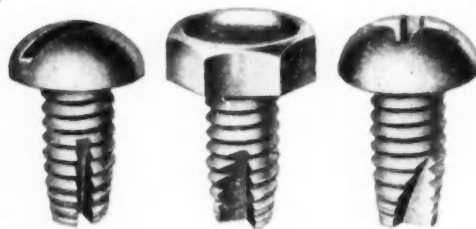
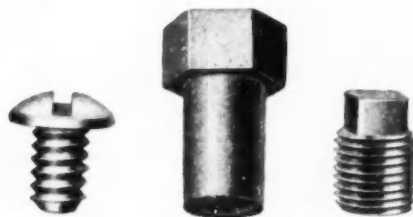
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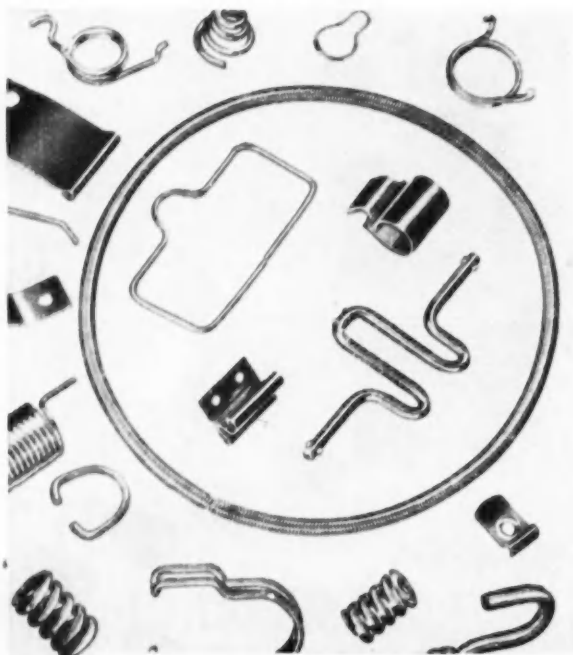
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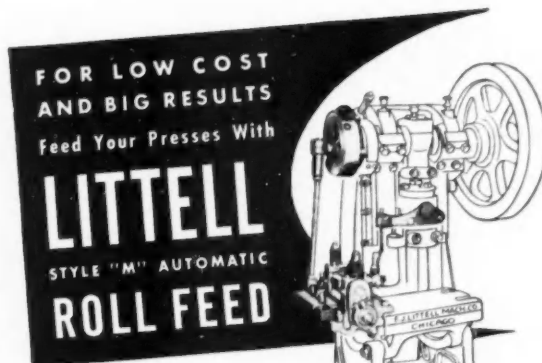


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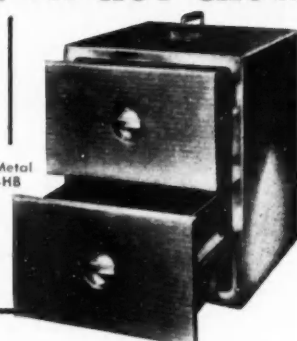
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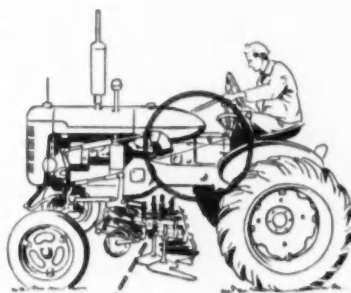
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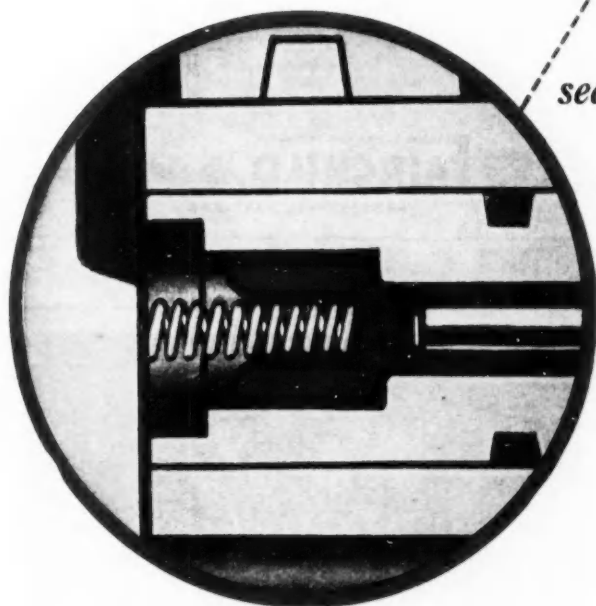


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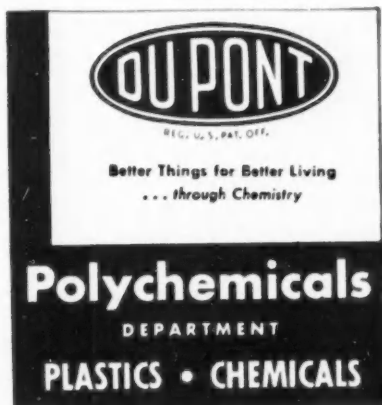
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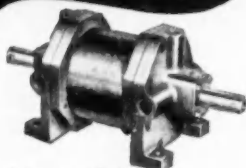
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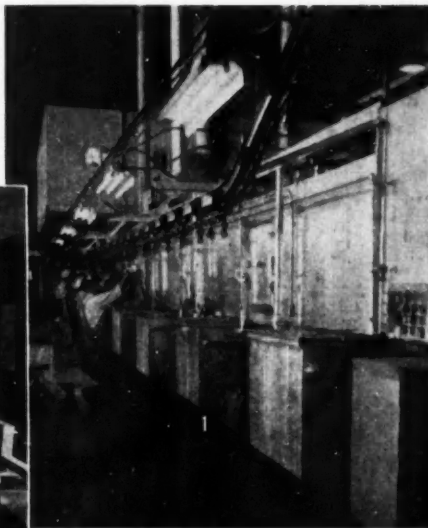
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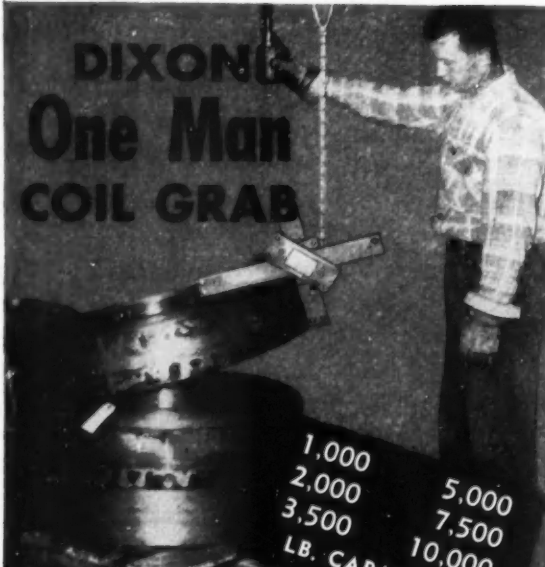
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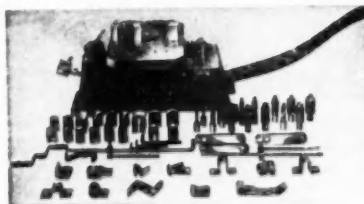


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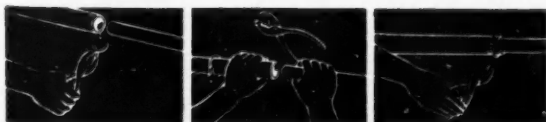
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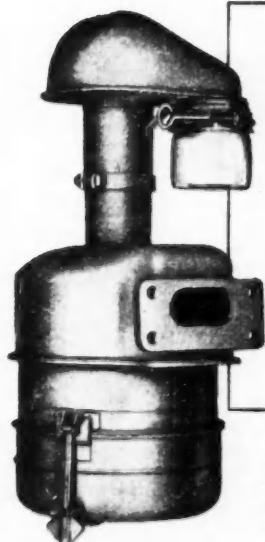


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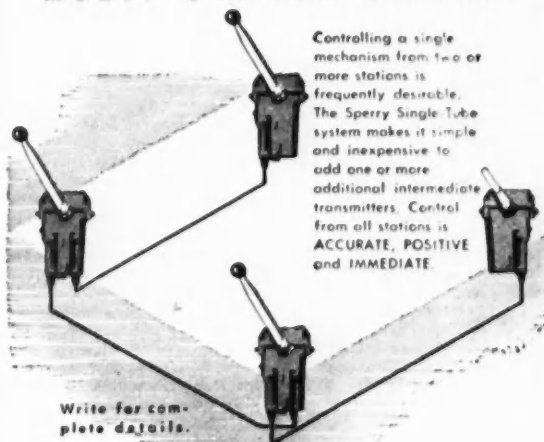
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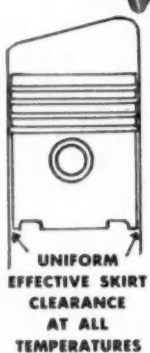
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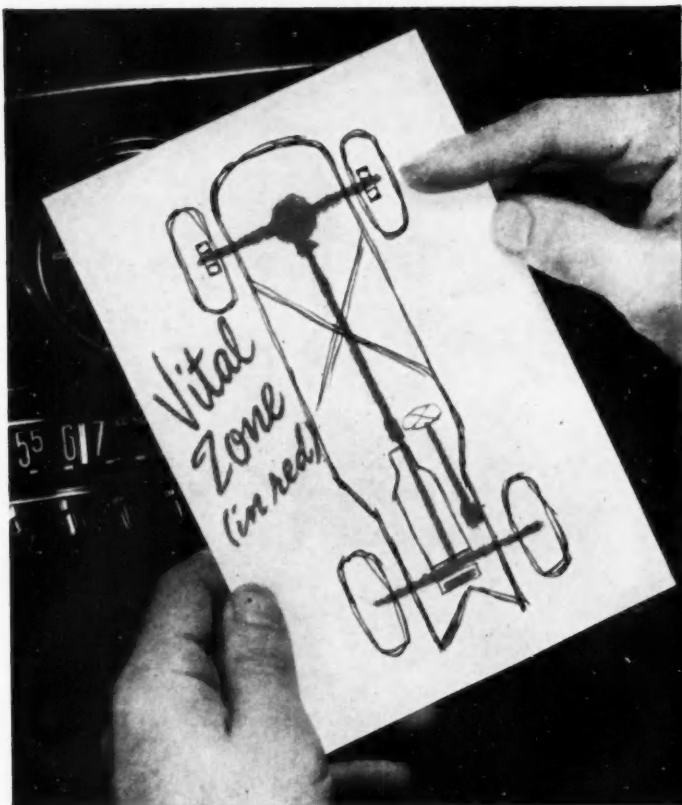
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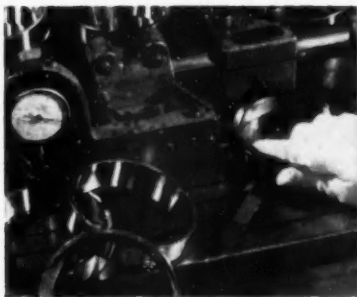
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$$\text{Value} = \frac{\text{quality} + \text{service} + \text{public acceptance}}{\text{price}}$$

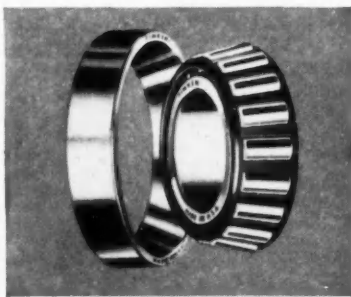
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